From:	Smith, Randy
To:	Sergakis, Georgianna
Cc:	Sutherland, Sue; Kwiek, Nicole; Reed, Katie; Smith, Randy; Griffiths, Rob; Greenbaum, Rob; Sutherland, Sue; Duffy, Lisa; Hunt, Ryan; Onate, James; Weaver, Lindy
Subject:	Proposal to add a Cardiac Sonography track to the existing BS Radiologic Sciences and Therapy Sonography Program-Echocardiography program
Date:	Thursday, May 29, 2025 4:34:49 PM
Attachments:	image001.png

Georgianna:

The proposal from the School of Health and Rehabilitation Sciences to add a Cardiac Sonography track to the existing Bachelor of Science Radiologic Sciences and Therapy Sonography Program - Echocardiography program was approved by the Council on Academic Affairs at its meeting on May 28, 2025. Thank you for attending the meeting to respond to questions/comments.

No additional level of internal review/approval is necessary. This action will be included in the Council's next Annual Activities Report to the University Senate (July 2025).

The Office of the University Registrar will work with you on implementation issues.

Please keep a copy of this message for your file on the proposal and I will do the same for the file in the Office of Academic Affairs.

If you have any questions please contact the Chair of the Council, Professor Sue Sutherland (.43), or me.

Randy

THE OHIO STATE UNIVERSITY

W. Randy Smith, Ph.D.
Vice Provost for Academic Programs
Office of Academic Affairs
University Square South, 15 E. 15th Avenue, Columbus, OH 43201
614-292-5881 Office
smith.70@osu.edu
Assisted by:
Katie Reed
Executive Assistant
(614) 292-5672

From: Weaver, Lindy
To: Reed, Katie
Subject: New Proposal for CAA
Date: Friday, March 7, 2025 6:32:29 PM
Attachments: Echocardiography Proposal_CAA_March 2025.pdf

Hi Katie,

Attached is a program proposal from HRS, Radiologic Sciences, Sonography program. This is for CAA review. Let me know if you have any questions or additional items needed.

Thanks!
Lindy

Program Proposal
BS-Radiologic Sciences
Sonography Program

Overview

The Undergraduate program in Radiologic Sciences and Therapy currently offers three different degree tracks to fit learner needs and to produce different types of specialized practitioners: Radiography, Sonography, and Radiation Therapy. Each of these three leads to a unique training experience and prepares learners for different credentialing exams and specialty practice areas. The Sonography program within Radiologic Sciences and Therapy submitted a request to add Echocardiography (also known as Cardiac Echocardiography) to their program. The organizational structure of the program and the curricular plan are included in this proposal. The original proposal was submitted to the HRS Curriculum Committee in September 2024. The committee requested revisions and the proposal was resubmitted, and subsequently approved, in November 2024. The curriculum director of Radiologic Sciences and Therapy then collaborated with the HRS Director of Academic Affairs to finalize the proposal documents for submission to CAA.

Table of Contents

THE OHIO STATE UNIVERSITY

School of Health and Rehabilitation Sciences
Academic Affairs

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https://hrs.osu.edu/

November 19, 2024

Curriculum Committee
School of Health and Rehabilitation Sciences
The Ohio State University

Dear Drs. Hunter and Sergakis,

On November 15, 2024, the HRS Curriculum Committee reviewed the revised proposal to add a Cardiac Sonography track to the existing Sonography program within the Division of Radiologic Sciences and Therapy. The proposal was approved unanimously with no further requested revisions.

We are so grateful for your program's ongoing commitment to teaching excellence. We will move this proposal through the University approval processes and will communicate with you regarding these approvals or any further requested information. Thank you.

Sincerely,

Lindy Weaver, PhD, MOT, OTR/L
Associate Professor, Clinical
Director, Academic Affairs

Proposal to Add Echocardiography to Division of Radiologic Sciences and Therapy-School of Health and Rehabilitation Sciences

Proposal: Adding New Plan to the BS Radiologic Sciences and Therapy Sonography Program-Echocardiography

Name: Echocardiography Plan in Sonography Program
Proposed Start Date: AU26
Unit/College: Division of Radiologic Sciences and Therapy; School of Health and Rehabilitation Sciences; College of Medicine

Rationale & Purpose
The newly proposed Echocardiography plan in the Division of Radiologic Sciences and Therapy (RST) in the School of Health and Rehabilitation Sciences (HRS; College of Medicine) will train students in the ultrasound specialty of adult cardiac sonography. By the end of the program, graduates will qualify to sit for credentialling exams in both Sonography Principles and Instrumentation (https://www.ardms.org/get-certified/spi/) as well as Adult Echocardiography (https://www.ardms.org/get-certified/rdcs/adult- echocardiography/). The existing, accredited, Bachelor of Science (BS) OSU program in sonography trains students in concentration areas that include abdominal, obstetric and gynecology, and vascular technology but does not offer the in-demand didactic and clinical training necessary for cardiac sonography (also known as echocardiography). By adding this content as a separate program plan to the existing sonography program in RST, Ohio State will continue to be at the forefront of training healthcare practitioners in central Ohio to meet the growing healthcare workforce demands.

This proposal supports local, state, and national efforts to meet identified workforce development needs in the healthcare field. The Bureau of Labor Statistics (BLS) projects a 10% growth rate in diagnostic medical sonography and cardiovascular sonography positions between 2022 and 2032 which outpaces the average for all occupations (https://www.bls.gov/ooh/healthcare/diagnostic-medical-sonographers.htm). Additionally, healthcare is one of ten targeted industries for workforce development in the state of Ohio (https://www.jobsohio.com/annual-report-2022) suggesting a critical need for residents of the state as well as enhanced opportunities for strategically addressing this need.

Currently, there are only 9 Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredited echocardiography programs in the state of Ohio with degree levels ranging from Certificate to Bachelor of Science. However, there are no programs located in Columbus. The only program serving central Ohio students is located at Central Ohio Technical College (COTC). However, despite students from COTC performing clinical rotations at OSUMC, the Director of Echocardiography (Dr. Tim Obarski; personal communication) and data provided below (Figures 1 -2) suggest a consistently understaffed OSUMC department and a concomitant increasing demand for these types of cardiac exams. Coupled with the BLS projected 10% growth rate over the next 10 years, these data suggest graduates of an Echocardiography plan will have ample employment opportunities and career longevity at OSUMC and other hospital systems. Attached is a letter of support for the development of a echocardiography specialty from Dr. Richard Gumina, Director of the Division of Cardiovascular Medicine at OSUMC (Appendix A).

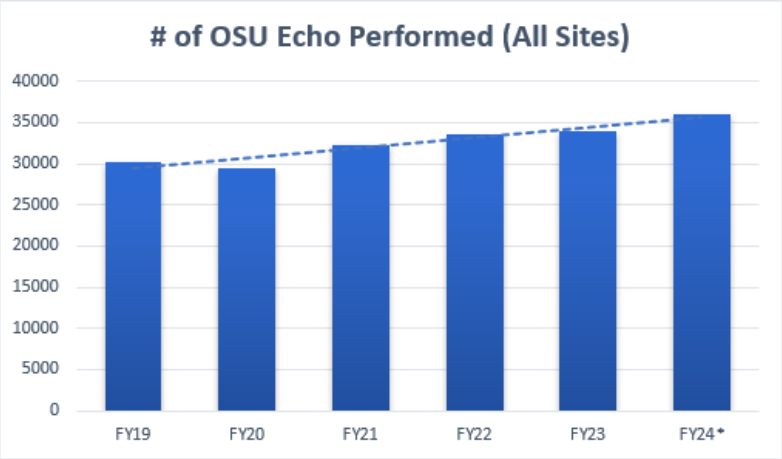


Figure 1: Combined number of echocardiography exams performed at all OSUMC sites (inpatient and ambulatory). With expansion of facilities, this 6 year growth trend is expected to continue exponentially (data provided by the Department of Cardiology, OSUMC).

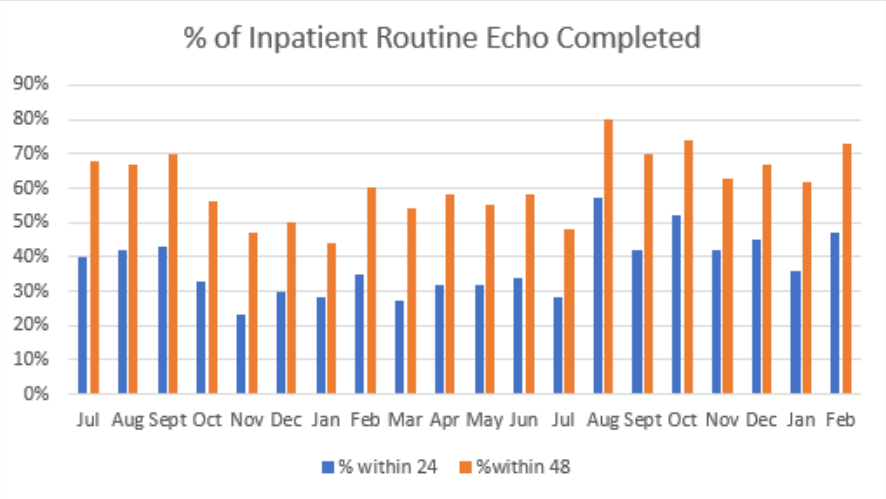


Figure 2: OSUMC's goal is for 70% of cardiac ultrasounds to be completed within 24 hours and 100% within 48 hours; however, due to technologist shortages, both goals remain consistently unmet over the past year (data provided by the Department of Cardiology, OSUMC).

Current Organization of OSU Sonography Program:

The current organization of the OSU Sonography program is as follows:

- **Jodi Eshelman: Program Director**
  - Sundus Mohammed: Concentration Coordinator (vascular technology), Clinical Coordinator

- Rachel Pargeon: Concentration Coordinator (abdominal and OB/GYN), Clinical Coordinator

The Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS) accredits the sonography program as a whole under the guidance of the Program Director (Eshelman). Each specialty area (abdomen, OB/GYN, vascular technology) is then assigned a "Concentration Coordinator" who often (though it is not required) also serves as the Clinical Coordinator for said specialty. For accreditation purposes, the addition of an echocardiography specialty or concentration area will require only that a concentration coordinator for the specialty be identified and report to the Program Director (Eshelman). Jodi Eshelman will remain Program Director of the Sonography Program while this proposal seeks to add the Echocardiography plan to the existing organization without disruption of the other specialties.

As of July 17th, 2024, the existing Sonography program received a 10-year national re-accreditation from the Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS) and the Commission on Accreditation of Allied Health Education Programs (CAAHEP; www.caahep.org). Ten-year accreditation periods are reserved for high performing programs and are the longest option for accreditation appointments demonstrating excellence in clinical education in the existing program. Adding an Echocardiography plan (or in the terminology of CAAHEP and JRC-DMS: concentration area) will require the development of some specific specialty courses and dedicated clinical placements that differ from our existing program courses and clinical experiences; however, the success of the processes, training (didactic, laboratory, and clinical) from experienced faculty, and HRS resources and student support necessary to achieve a successful 10-year re-accreditation award will provide a solid foundation for developing this new plan.

Due to the robust didactic and clinical curriculum in place for the Sonography program, RST and HRS will leverage existing general principles of sonography curriculum, partnerships and relationships with clinical sites (particularly OSUMC), expertise in experiential learning that include clinical rotations, and work to develop new echocardiography specific courses to create this plan. Offering a Bachelor of Science (BS) in this specialty will meet the demand for vacancies in diagnostic imaging workforce that will continue to grow with the opening of the new inpatient OSUMC tower (2026) and the development of strategic OSUMC partnerships with other hospitals across central Ohio to create new Heart and Vascular Centers.

Relationship to current major and minor programs in the department(s):

The existing RST Sonography program accepts students (n=10 per cohort) to begin their professional education in autumn semester of year 3. Subsequently, students undertake a rigorous 5 semester training curriculum that includes integrated experiential learning (clinical rotations) with didactic and lab-based preparation. The existing Sonography program curriculum is unique in that it requires students to complete the Abdomen and OB/Gyn program during the junior year (year 3) and the Vascular Technology program during the senior year (year 4). Upon graduation, our students have the opportunity to become ARDMS registered in Abdomen (AB), OB/Gyn (OB), and Vascular (RVT).

The addition of an Echocardiography plan will allow the program to double in size by adding 10 more applicants per cohort dedicated to this plan. These students will take some foundational courses such as patient care and ultrasound physics with the students enrolled in the existing sonography program. However, due to the extensive curricular expectations of the

Adult Echocardiography credentialing exam, students enrolled in the echocardiography program will branch into cardiac ultrasound specific courses (to be developed; see #5 below) and clinical placements.

Learning Competencies and Curricular Development:

Since JRC-DMS/CAAHEP accreditation is for the program as a whole, followed by approval of concentration specialties, all students enrolled in the Sonography program, regardless of specialty, are expected to meet the same general learning outcomes (Appendix B). In addition to these programmatic goals, each specialty has explicit learning competencies set by the CAAHEP Standards and Guidelines for the Accreditation of education Programs in Diagnostic Medical Sonography (https://www.jrcdms.org/standards.htm#gsc.tab=0). The proposed curriculum for the Echocardiography specialty plan has been outlined using the competencies listed for Adult Cardiac Sonography Concentration (Appendix B; pgs. 19-21). A curricular mapping process identified existing Sonography program courses that could be to meet the overall programmatic learning outcomes (i.e., the graduates of the Echocardiography specialty will meet the same programmatic expectations as their peers in the Sonography program). Subsequently, the CAAHEP standards were utilized to initially develop courses specific to this content. **New cardiac ultrasound courses will be further developed once the program is approved and a Concentration Coordinator is hired. These will be submitted for official approval following full development.**

Student and Programmatic Assessment:

Student and graduate outcomes for the newly proposed specialty will be assessed following the existing and highly successful, JRC-DMS monitored methods used by the sonography program. During the program, evaluation of clinical progress is completed multiple times each rotation. These evaluations help determine the student's progress in clinical and their progress to achieving the amount of required clinical competencies for each semester. Evaluation of student's progress is completed by in-person site visits, emails, phone calls, and e*Value (clinical management system). Documentation of communication is recorded in e*Value within the Faculty Site Visit Evaluation tab (note: the Division will be transferring to the new clinical management system adopted by HRS when appropriate). The clinical management system is used to manage, collect, and analyze student data to assess progress in the clinical competencies. Students use the system to submit clock in/out entries, competencies, mid/final evaluations, evaluation of clinical sites, and evaluation of their clinical instructors. Students submit exam competencies and designate the percentage of the exam performed by the student. Students are required to include if the findings were normal or if pathology was noted.

Additionally, the program is required to maintain and evaluate during yearly Advisory Committee (comprised of faculty, staff, clinical instructors, and community stakeholders) meetings the official national credentialing results of our graduates. Programmatic evaluations are also discussed. These include yearly program **graduate surveys, employer surveys and feedback provided in the clinical management system, as well as data on pass/fail rate of national credentialling exams for each cohort.** In their survey, graduates of the program are asked about their didactic and clinical experiences. Employer surveys are asked to provide feedback on the preparedness and skills of their newly hired graduates of our program. Advisory Committee discussions are documented, and action plans are implemented to address areas of

improvement each year. Assessments of these actions are performed using new data the following year.

The students enrolled in the echocardiography specialty will be evaluated using the same methodologies as their peers outlined above. We will work with the clinical sites, primarily OSUMC initially but any additional sites added over the course of the program, to include appropriate individuals in the sonography program Advisory Committee to provide valuable strategic input for the new specialty plan.

Identify any overlaps with other programs or departments within the university. Append letters of concurrence or objection from related units.

This plan does not overlap with other programs or departments outside of HRS and does not require letters of concurrence.

Identify any unique characteristics or resources that make it particularly appropriate for Ohio State to offer the proposed new plan.

The Ohio State University's Division of Radiologic Sciences and Therapy, founded in 1971, has a long-standing tradition of providing high quality education for students seeking healthcare careers by offering traditional undergraduate programs. The division currently offers three primary areas of training (individual programs): Radiography, Radiation Therapy, and Diagnostic Medical Sonography/Vascular Technology. Graduates of the program are eligible to apply to sit for the national registration examinations through the American Registry of Radiologic Technologists (ARRT) or the American Registry of Diagnostic Medical Sonography (ARDMS) and may be licensed to practice in Ohio. The existing Sonography program was created in response to requests from the surrounding community for an educational program that could offer a baccalaureate degree in Ultrasound. The first cohort of sonography students were admitted to the program in August of 2007. Thus, the Division has a 17-year history of successfully training over 170 sonographers who have obtained multiple credentials and are leading the field in diagnostic medical imaging.

The Ohio State Wexner Medical Center Departments of Cardiology, Radiology, and Radiation Therapy have approached leadership in HRS to create a strategic partnership to meet workforce development initiatives. This proposal is being led by the Directors of Strategic Initiatives and Office of Academic Affairs in HRS with support from OSUMC. The strategic collaboration for growth in the clinical training programs offered in HRS explicitly highlights support from OSUMC for developing an echocardiography curriculum and trainees. The OSUMC Department of Cardiology (Drs. Obarski and Gumina) has explicitly committed to providing clinical placements and on-site clinical instructors to train the students enrolled in this program.

Resources (Equipment, Facilities, Faculty)

The target semester enrollment will be AU 26 provided resources are secured. OSUMC has committed to place 12 students per cohort for clinical instruction for which there will be no financial or workload requirements from HRS.

The under-review workforce initiative partnership between OSUMC and HRS **may** include financial support for the development of the Echocardiography specialty as well as other programs. Regardless, HRS and the RST are committed to investing resources into the faculty

required to develop and implement this specialty track. Current workload calculations (Appendix C) suggest a total of 1.5 FTE is necessary to develop and implement the curriculum. RST requests an Instructor of Practice (1.0 FTE) to be the Concentration Coordinator for Echocardiography specialty, further develop and seek approval of cardiac ultrasound specific courses in green (Table 1) and teach the newly developed courses. This individual must be certified in adult cardiac sonography/echocardiography. **The interview process is currently underway to identify and hire this person**.

Additionally, a 0.5 FTE is necessary for the clinical coordinator specifically assigned to the echocardiography cohort. This individual will organize clinical placements, monitor the clinical management system and student progress in clinical competencies, and assist in lab-based preparation. This faculty member will also need cardiac sonography/echocardiography certification and can be hired as a lecturer or instructor of practice. RST currently has a 0.5 FTE vacant position to commit (Appendix C).

Timeline: Due to the nature of the proposed curriculum (Table 1 below), new courses will be designed and submitted for approval prior to AU26 start date. Due to leveraging existing fundamentals of sonography courses, echocardiography courses can be designed over time concurrently while the first cohort is enrolled. The curricular development will begin once the Instructor of Practice (1.0 FTE) Concentration Coordinator is hired (currently under review).

Equipment and space: Lab-based courses can utilize the existing sonography program laboratory space on a schedule that works for all specialties. Some of the existing sonography equipment (transducers with computers) can be used for training. However, it will be necessary to supplement existing equipment including a cardiac-specific phantom. Quotes will be obtained from appropriate vendors upon approval and implementation. There is a component of the workforce initiative OSUMC-HRS proposal that could provide financial assistance for this equipment.

Student Enrollment

Indicate the number of students you anticipate will take this plan.

The target number of students for the newly proposed Echocardiography plan per cohort will be 10. Students will apply in year 2 for Autumn semester admission of their year 3. This cycle will follow the current process for all programs in the Division. The newly proposed curriculum will follow the professional education model of 5 semesters until graduation; thus, there will be 20 students enrolled in the Echocardiography plan at any given time. Given the accreditation limitations on clinical placement education for sonography, this number will maintain the high-level of instruction our students receive while at clinical rotations. Projected clinical placements at OSUMC will support cohorts of 10 students per year to meet exam competencies required by accreditation (JRS-DMS and CAAHEP) as well as those required to sit for the credentialing examination (https://www.ardms.org/get-certified/rdcs/adult-echocardiography/).

In terms of recruitment, the number of HRS pre-majors, who predominant the applications to the clinical programs in RST, continues to demonstrate a year over year increase (AU24: ~450 new first year students enrolled in HRS). All HRS pre-majors complete HRS coursework in their first year (HTHRHSC 1100) that provides introductions to the clinical programs to which they can apply. The Division of Radiologic Sciences and Therapy historically has the largest number of applicants per year of the undergraduate clinical programs in HRS. Thus, with the addition of

the Echocardiography plan, we feel strongly that the large HRS pre-major population will provide adequate volume of highly qualified applicants to fill at least 10 positions per admission year.

The target yearly enrollment is currently limited by available clinical placements within OSUMC and across central Ohio; however, as the demand for adult cardiac sonography exams continues to rise and OSUMC continues to expand to the new inpatient tower as well as existing ambulatory facilities and newly developed Heart and Vascular Centers around central Ohio, the ability to accommodate larger cohorts will be possible with the proposed curriculum.

Curricular Requirements

Pre-requisites for applicants to the Echocardiography plan will be identical to those required for the existing sonography program (Appendix D for existing sonography program guide and the echocardiography program guide). Both traditional and transfer students will be expected to meet pre-requisite expectations that are designed to 1). Fulfill OSU GE requirements for a bachelor's degree and 2). Prepare applicants for specialized training in the medical field.

The programmatic curriculum for the Echocardiography specialty will be offered as an **in-person academic experience** to match the other specialties in the Sonography program. Learning competencies for diagnostic medical sonography, including the newly proposed adult Echocardiography specialty, are strictly outlined by the accrediting organization CAAHEP (Appendix B) (https://www.jrcdms.org/standards.htm#gsc.tab=0). The incorporation of these into the new curriculum will be reviewed by JRC-DMS to grant contingent accreditation for a new concentration area. The curricular coursework specific to cardiac ultrasound training will be taken in lockstep fashion and is outlined in Table 1 and the program guide in Appendix D. Table 2 demonstrates the traditional sonography program curriculum for comparison to the newly proposed Echocardiography plan. Appendix E includes syllabi for the courses that will be developed to meet the specialty learning competencies outlined for training cardiac sonographers. The curriculum (5 semesters) will include 24 practicum (clinical) hours over 3 semesters, 18 credit hours of newly developed cardiac ultrasound specific didactic courses, and 23 credit hours of existing RST courses.

Table 1: Curricular outline for Echocardiography plan. Existing courses in black, new courses in green. Course title abbreviations with credit hours per semester (Appendix D for new course syllabi and complete course titles).

Year 3		
Autumn Semester	**Spring Semester**	**Summer Semester**
Intro to RadSci- Patient Care (2)	Sectional Anatomy (3)	Cardiac Sono Practicum I (8)
DMS Physics I (3)	DMS Physics II (3)	Quality Management in RadSci (3)
HthRhSc 4200- Scientific Writing (3)	Cardiac Disease and Assessment with US I (5)	Cardiac Disease and Assessment with US II (3)
Fund. Of Heart Anatomy and Echo (4)	Pharmacology (2)	GE Foundation course (3-4)

Year 4	
Autumn Semester	**Spring Semester**
Cardiac Sono Practicum II (7)	Cardiac Sono Practicum III (9)
Administration in RST (2)	Transitions to clinical practice (2)

Advanced Procedures & Techniques of Echocardiography (3)	HthRhSc 4100- GE reflection course (1)
Cardiac Abnormalities and Interventions (3)	

Table 2: Current curricular outline for Sonography program students with concentration areas of abdomen, OBGYN, and vascular technology. Courses are taken in lockstep fashion.

Year 3		
Autumn Semester	**Spring Semester**	**Summer Semester**
Intro to RadSci- Patient Care (2)	Sectional Anatomy (3)	DMS Physics 3 (2)
DMS Physics I (3)	DMS Physics II (3)	Quality Management in RadSci (3)
HthRhSc 4200- Scientific Writing (3)	Sonography II (3)	Sonography 3 (2)
Sonography I (3)	Pharmacology (2)	DMS Practicum 3 (7)
Sonography Practicum I (4)_	Sonography Practicum II (7)	

Year 4	
Autumn Semester	**Spring Semester**
Vascular 1 (3)	Vascular 2 (3)
Administration in RST (2)	Transitions to clinical practice (2)
Vascular Practicum I (7)	HthRhSc 4100- GE reflection course (1)
GE foundation course	Vascular Practicum 2 (7)

Honors Requirements

This plan will not offer any honors courses. The current sonography program does not currently offer honors options for students.

Cite the benefits for students, the institution, and the region or state.

Historically, students of all programs in The Division of Radiologic Sciences and Therapy have employment offers prior to their graduation due to the high demand for skilled healthcare imaging technologists and the close relationships the students develop with potential employers during their clinical education rotations. The Ohio State University is well respected in the medical imaging field for producing competent and compassionate sonographers in multiple specialties. By adding a Cardiac Sonography specialty to the existing baccalaureate level training, OSU's sonography program will continue to increase its reputation for producing in-demand and highly competitive leaders in the diagnostic medical sonography field.

Indicate whether this plan within the Sonography program was submitted for approval previously. Explain at what stage and why the proposal was not approved or was withdrawn.

This is the first submission of the Echocardiography plan for approval.

Appendix A

Letter of Support from Dr. Richard Gumina, Director, Division of Cardiovascular Medicine

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Division of Cardiovascular Medicine
Department of Internal Medicine
College of Medicine
Davis Heart and Lung Research Institute
601 DHLRI
473 West 12th Avenue
Columbus, OH 43210

August 25, 2024

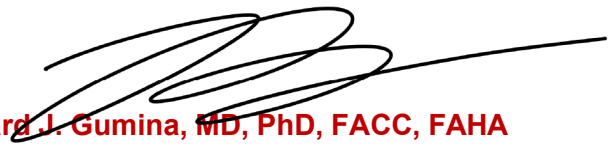
Randee L. Hunter, PhD
Associate Professor-Clinical
Director of HRS MS Program
RST Director of Curriculum
Division of Radiologi Sciences and Therapy
School of Health and Rehabilitation Sciences
College of Medicine
The Ohio State University

Dear Dr. Hunter:

I serve as the Director of the Division of Cardiovascular Medicine at The Ohio State University College of Medicine and Wexner Medical Center, and I am incredibly excited and fully supportive of your proposal to develop a Cardiac Sonography program. As you are aware, over 7 million echocardiograms are performed in the United States each year. Within our own system, we perform over 35,000 echocardiogram each year, and this number is expected to continue to grow. We have experienced and continue to experience a shortage of cardiac sonographers, both in-patient and out-patient and the ability to train future cardiac sonographers will be critically important to our mission. With the opening of the new in-patient tower at OSUWMC, we will need to expand the number of cardiac sonographers to meet the anticipated in-patient demands. In addition, with outpatient clinics in Upper Arlington, Dublin, OSU East, and New Albany, and a new clinic being constructed in Powell, our need for cardiac sonographers continues to expand to meet our clinical demand. As we build out outreach clinics such as our venture with Memorial Hospital in Marysville and beyond, we see only a continued need for cardiac sonographers. What I have described is just within our system. We know that there is a constant need for cardiac sonographers at our local and regional competitors. Based upon these needs, TI have no doubt of the ability to build a sustainable program in which trainees can find employment. In addition, we have had a robust history of providing clinical placements and training and plan to continue our collaboration to train the cardiac sonographers of the future.

Again, I fully support your Cardiac Sonography program. Do not hesitate to contact me if I can provide any further information to those reviewing your critical proposal that will have direct impact on our ability to continue our growth trajectory to provide care for our patients throughout Ohio.

Best regards,



Richard J. Gumina, MD, PhD, FACC, FAHA
Professor of Internal Medicine
Director, Division of Cardiovascular Medicine
James W. Overstreet Chair in Cardiology
Division of Cardiovascular Medicine
Department of Medicine
College of Medicine
The Ohio State University Wexner Medical Center
Cell: 740-602-1552
Email: richard.gumina@osumc.edu

Appendix B

OSU Sonography Program Learning Competencies and CAAHEP Cardiac Learning Competencies

THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

Division of
Radiologic Sciences and Therapy
School of Health and Rehabilitation Sciences

Sonography Program Goals & Student Learning Outcomes

Our mission is realized by assuring our students will be able to:

1. To prepare competent entry-level sonographers in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains for the following concentration(s) it offers:
    - Abdominal Sonography- Extended Adult
    - Obstetrics and Gynecology Sonography
    - Vascular Sonography

    Learning Outcomes:
    - Students will demonstrate scanning skills in the performance of sonographic exams.
    - Students will demonstrate quality patient care skills.
    - Graduates will demonstrate competence in the work environment.

2. Demonstrate critical thinking through evidence-based practice and professional decision making in the care of patients.

    Learning Outcomes:
    - Students will maintain clinical competency of examinations and apply critical thinking skills to adapt to non-routine patients and environments of patients.
    - Students will critique sonographic images for diagnostic quality and make adjustments to technical factors and body mechanics, when necessary, in order to provide optimal images.

3. Communicate in a clear and effective manner, both verbally and in writing with people of diverse backgrounds.

    Learning Outcomes:
    - Students will demonstrate effective oral communication with patients.
    - Students will demonstrate effective oral communication with staff.
    - Students will demonstrate effective scientific writing and presentation skills.

4. Cultivate a professional work ethic and interprofessional collaboration, demonstrating a positive attitude and leadership skills.

    Learning Outcomes:
    - Students/Graduates will exhibit a professional work ethic in the clinical setting.
    - Students will participate in interprofessional education (IPE) events throughout their time within the program.

Commission on Accreditation of Allied Health Education Programs

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

Essentials/Standards initially adopted in 1979; revised in 1987, 1996, 2007, 2011 and 2020 by the:

American College of Cardiology
American College of Radiology
American Institute of Ultrasound in Medicine
American Society of Echocardiography
American Society of Radiologic Technologists
International Contrast Ultrasound Society
Society of Diagnostic Medical Sonography
Society for Vascular Surgery
Society for Vascular Ultrasound
Joint Review Committee on Education in Diagnostic Medical Sonography
and
Commission on Accreditation of Allied Health Education Programs

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

These accreditation **Standards and Guidelines** are the minimum standards of quality used in accrediting programs that prepare individuals to enter the Diagnostic Medical Sonography profession. Standards are the minimum requirements to which an accredited program is held accountable. Guidelines are descriptions, examples, or recommendations that elaborate on the Standards. Guidelines are not required but can assist with interpretation of the Standards.

Standards are printed in regular typeface in outline form. *Guidelines* are printed in italic typeface in narrative form.

Preamble

The Commission on Accreditation of Allied Health Education Programs (CAAHEP), Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS), the American College of Cardiology, American College of Radiology, American Institute of Ultrasound in Medicine, American Society of Echocardiography, American Society of Radiologic Technologists, International Contrast Ultrasound Society, Society of Diagnostic Medical Sonography, Society for Vascular Surgery, and Society for Vascular Ultrasound 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 minimum standards outlined in these accreditation **Standards and Guidelines**. Lists of accredited programs are published for the information of students, employers, educational institutions and agencies, and the public.

These **Standards and Guidelines** 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 accreditation Standards.

Description of Profession

Diagnostic medical sonography is a multi-specialty profession comprised of abdominal sonography, breast sonography, cardiac sonography, musculoskeletal sonography, obstetrics and gynecology sonography, vascular sonography, and other emerging clinical areas. These diverse areas all use ultrasound as a primary technology in their daily work.

The diagnostic medical sonographer is an individual who provides patient care services using ultrasound and related diagnostic procedures. The diagnostic medical sonographer must be educationally prepared and clinically competent as a prerequisite to professional practice. Demonstration and maintenance of competency through certification by a nationally recognized sonography credentialing organization is the standard of practice in sonography, and maintenance of certification in all areas of practice is endorsed.

The diagnostic medical sonographer functions as a delegated agent of the physician and does not practice independently.

Diagnostic medical sonographers are committed to enhanced patient care and continuous quality improvement that increases knowledge and technical competence.

Diagnostic medical sonographers use independent, professional and ethical judgment, and critical thinking to safely perform diagnostic sonographic procedures.

The diagnostic medical sonographer generally performs the following:

- Obtains, reviews, and integrates pertinent patient history and supporting clinical data to facilitate optimum diagnostic results;
- Performs appropriate procedures and records anatomic, pathologic, and/or physiologic data for interpretation by a physician;
- Records, analyzes, and processes diagnostic data and other pertinent observations made during the procedure for presentation to the interpreting physician;
- Exercises discretion and judgment in the performance of sonographic and/or related diagnostic services;
- Demonstrates appropriate communication skills with patients and colleagues;
- Acts in a professional and ethical manner;
- Facilitates communication and education to elicit patient cooperation and understanding of expectations and responds to questions regarding the sonographic examination.

As a multi-specialty profession, these Standards apply to the following learning concentrations:

- Abdominal Sonography - Extended
- Adult Cardiac Sonography
- Breast Sonography
- Musculoskeletal Sonography
- Obstetrics and Gynecology Sonography
- Pediatric Cardiac Sonography
- Vascular Sonography

Programs may be developed to meet one or more of these learning concentrations.

Related diagnostic procedures may include, but not limited to, physiologic arterial testing, venous ablation guidance, guidance for interventional procedures, and addition of contrast administration.

I. Sponsorship

A. Sponsoring Institution

A sponsoring institution must either award credit for the program or have an articulation agreement with an accredited post-secondary institution, and must be at least one of the following:

1. A post-secondary academic institution accredited by an institutional accrediting agency that is recognized by the U.S. Department of Education and authorized under applicable law or other acceptable authority to provide a post-secondary program, which awards a minimum of a certificate/diploma at the completion of the program.

2. A hospital, clinic or medical center that is institutionally accredited and authorized under applicable law or other acceptable authority to provide healthcare, which awards a minimum of a certificate/diploma at the completion of the program.

3. A branch of the United States Armed Forces or other Federal agency, which awards a minimum of a certificate/diploma at the completion of the program.

B. Consortium Sponsor

1. A consortium sponsor is an entity consisting of two or more members that exists for the purpose of operating an educational program. In such instances, at least one of the members of the consortium must meet the requirements of a sponsoring institution as described in I.A.

2. The responsibilities of each member of the consortium must be clearly documented as a formal affiliation agreement or memorandum of understanding, which includes governance and lines of authority.

C. Responsibilities of Sponsor

The Sponsor must assure that the provisions of these **Standards and Guidelines** are met.

II. Program Goals

A. Program Goals and Outcomes

There must be a written statement of the program's goals and learning domains consistent with and responsive to the demonstrated needs and expectations of the various communities of interest served by the educational program. The communities of interest that are served by the program must include, but are not limited to, students, graduates, faculty, sponsor administration, employers, physicians, and the public.

Program-specific statements of goals and learning domains provide the basis for program planning, implementation, and evaluation. Such goals and learning domains must be compatible with the mission of the sponsoring institution(s), the expectations of the communities of interest, and nationally accepted standards of roles and functions. Goals and learning domains are based upon the substantiated needs of health care providers and employers, and the educational needs of the students served by the educational program.

B. Appropriateness of Goals and Learning Domains

The program must regularly assess its goals and learning domains. Program personnel must identify and respond to changes in the needs and/or expectations of its communities of interest.

An advisory committee, which is representative of at least each of the communities of interest named in these **Standards**, must be designated and charged with the responsibility of meeting at least annually, to assist program and sponsor personnel in formulating and periodically revising appropriate goals and learning domains, monitoring needs and expectations, and ensuring program responsiveness to change.

Advisory committee meetings may include participation by synchronous electronic means.

C. Minimum Expectations

The program must have the following goal defining minimum expectations: To prepare competent entry-level sonographers in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains for the following concentration(s) it offers:

Abdominal sonography - Extended
Adult cardiac sonography
Breast sonography
Musculoskeletal sonography
Obstetrics and gynecology sonography
Pediatric cardiac sonography
Vascular sonography.

Programs adopting educational goals beyond entry-level competence must clearly delineate this intent and provide evidence that all students have achieved the basic competencies prior to entry into the field.

Nothing in this Standard restricts programs from formulating goals beyond entry-level competence.

III. Resources

A. Type and Amount

1. Program Resources

Program resources must be sufficient to ensure the achievement of the program's goals and outcomes. Resources must include, but are not limited to: faculty, clerical and support staff; curriculum; finances; offices; classroom, laboratory, and ancillary student facilities; clinical affiliates; equipment; supplies; computer resources, instructional reference materials, and faculty/staff continuing education.

Support staff should be available to provide counseling or referral for problems that may interfere with the student's progress through the program. Guidance should be available to assist students in understanding course content and in observing program policies and practices.

2. Clinical Affiliates

Clinical affiliates must provide each student access to adequate numbers and a variety of types of diagnostic medical examinations to develop clinical competency in both normal and abnormal findings for the learning concentrations(s) being offered.

Programs should provide students with a variety of patient care settings in which sonographic procedures are performed on in-patients and outpatients. These settings may include the following: ambulatory care facilities, specialty centers, emergency/trauma, intensive/critical/coronary care, surgery, angiography/cardiac catheterization.

The number of students assigned to the clinical affiliate should be determined by a student/clinical staff ratio that ensures equitable experiences and outcomes are met.

B. Personnel

The sponsor must appoint sufficient faculty and staff with the necessary qualifications to perform the functions identified in documented job descriptions and to achieve the program's stated goals and outcomes.

1. Program Director

The program director must hold an academic degree and be an appointed faculty member or institutional equivalent with the sponsor.

a. **Responsibilities**
The program director must be responsible for:
1) the structure and daily operation of the program;
2) the organization, administration, periodic review and evaluation, continued development, and effectiveness of program curricula; and
3) ensuring the effectiveness of all clinical affiliates is maintained.

Ensuring the effectiveness of clinical affiliates may be demonstrated through overseeing, monitoring, and communicating with the Clinical Coordinator regarding student clinical rotations, the number of cases, and completion of required competencies by all students.

b. Qualifications
The program director must:
1) possess a minimum of a Baccalaureate degree;
2) possess the appropriate credential(s) specific to one or more of the concentration(s) offered;
3) have documented experience in supervision, instruction, evaluation, student guidance and in educational theories and techniques; and
4) have a minimum of two years of clinical experience as a registered sonographer in the professional sonography field.

A master's degree is preferred.

Documentation of experience in educational theories and techniques may include completed college courses, seminars, or in-service sessions on topics including, but not limited to, learning theory, curriculum design, test construction, teaching methodology, or assessment techniques.

2. Clinical Coordinator(s)

Programs must have a faculty member or institutional equivalent designated as the Clinical Coordinator.

The Clinical Coordinator(s) must be an appointed faculty member or institutional equivalent with the sponsor.

a. Responsibilities
The clinical coordinator(s) must:
1) be responsible for coordinating clinical education with didactic education as assigned by the program director;
2) evaluate and ensure the effectiveness of clinical experiences for the concentration(s) students are enrolled in; and
3) provide clinical instruction and document the evaluation and progression of clinical performance leading to clinical competence.

b. Qualifications
The clinical coordinator(s) must:

1) possess an academic degree no lower than an Associate degree and at least equal to that for which the graduates are being prepared;
2) possess the appropriate credential(s) specific to the concentration(s) that s/he coordinates;
3) have documented experience in supervision, instruction, evaluation, student guidance and in educational theories and techniques; and
4) have a minimum of two years of clinical experience as a registered sonographer in the professional sonography field.

Documentation of experience in educational theories and techniques may include completed college courses, seminars, or in-service sessions on topics including, but not limited to, learning theory, curriculum design, test construction, teaching methodology, or assessment techniques.

The Clinical Coordinator may also serve as the Concentration Coordinator for the concentration(s) for which the Program Director does not possess an appropriate credential.

3. Concentration Coordinator(s)

The Concentration Coordinator(s) must be appointed faculty member or institutional equivalent with the sponsor.

a. Responsibilities
Concentration Coordinator(s) report(s) to the Program Director and must be designated and responsible for the coordination of concentration(s) for which the Program Director does not possess the appropriate credential.

b. Qualifications
Concentration Coordinator(s) must:
1) possess an academic degree no lower than an Associate degree and at least equal to that for which the graduates are being prepared;
2) possess the appropriate credential(s) specific to the concentration(s) that s/he is designated to coordinate;
3) have documented experience in supervision, instruction, evaluation, student guidance and in educational theories and techniques; and
4) have a minimum two years of clinical experience as a registered sonographer in the professional sonography field.

Documentation of experience in educational theories and techniques may include completed college courses, seminars, or in-service sessions on topics including, but not limited to, learning theory, curriculum design, test construction, teaching methodology, or assessment techniques.

The Concentration Coordinator may also serve as the Clinical Coordinator for the concentration(s) for which the Program Director does not possess an appropriate credential.

4. Medical Advisor

a. Responsibilities
The medical advisor must provide guidance that the medical components of the didactic and clinical curriculum meet current acceptable performance standards.

b. Qualifications
The medical advisor must be a licensed physician, certified by the American Board of Medical Specialties (ABMS), with relevant experience and knowledge in diagnostic medical sonography.

The medical advisor should participate in goal determination, curriculum development, and outcomes assessment.

5. Faculty/Instructional Staff

All faculty must be familiar with program goals and be able to demonstrate the ability to develop an organized plan of instruction and evaluation.

a. Responsibilities
Faculty/Instructional Staff must be responsible for providing instruction, evaluation of students, documentation of progress, and periodic review of course content.

b. Qualifications
Faculty/Instructional Staff must:
1) be qualified by education and experience, and be effective in teaching the subjects assigned; and
2) possess appropriate credential(s) for the learning concentration s/he are providing instruction and performing student evaluations.

6. Clinical Instructor(s)

A clinical instructor must be identified for each clinical affiliate.

a. Responsibilities
A clinical instructor must be available to students whenever a student is assigned to a clinical setting, provide appropriate clinical supervision, and be responsible for student clinical evaluation.

b. Qualifications
Clinical instructors must have the appropriate credential in the concentration(s) for which they evaluate student performance and document required clinical competencies.

C. Curriculum

The curriculum must ensure the achievement of program goals and learning domains. Instruction must be an appropriate sequence of the classroom, laboratory, and clinical activities. Instruction must be based on clearly written course syllabi that include a course description, course objectives, methods of evaluation, topic outline, and competencies required for graduation.

The program must demonstrate by comparison that the curriculum offered meets or exceeds the content and competencies specified in Appendix B.

D. Resource Assessment

The program must, at least annually, assess the appropriateness and effectiveness of the resources described in these **Standards.** The results of resource assessment must be the basis for ongoing planning and appropriate change. An action plan must be developed when deficiencies are identified in the program resources. Implementation of the action plan must be documented, and results measured by ongoing resource assessment.

IV. Student and Graduate (Outcomes) Evaluation/Assessment

A. Student Evaluation

1. Frequency and purpose

Evaluation of students must be conducted on a recurrent basis and with sufficient frequency to provide both the students and program faculty with valid and timely indications of the

students' progress toward and achievement of the competencies and learning domains stated in the curriculum.

2. Documentation

Records of student evaluations must be maintained in sufficient detail to document learning progress and achievements.

Records indicating the number and type of diagnostic medical examinations performed by the student, the examination findings, the extent of student supervision, and the level of involvement of the student in scanning/performance must be maintained.
Official records or electronic equivalent used to document the progression of learning and achievements must include name, credentials, and signature of the supervising sonographer.

B. Outcomes

1. Outcomes Assessment

The program must periodically assess its effectiveness in achieving its stated goals and learning domains. The results of this evaluation must be reflected in the review and timely revision of the program.

Outcomes assessments must include, but are not limited to: national credentialing examination(s) performance, programmatic retention/attrition, graduate satisfaction, employer satisfaction, job (positive) placement and programmatic summative measures. The program must meet the outcomes assessment thresholds.

"Positive Placement" means that the graduate is employed full or part-time in the profession or in a related field, or continuing his/her education or serving in the military. A related field is one in which the individual is using cognitive, psychomotor, and affective competencies acquired in the educational program.

"National credentialing examinations" are those accredited by the National Commission for Certifying Agencies (NCCA) or American National Standards Institute (ANSI). Participation and pass rates on national credentialing examination(s) performance may be considered in determining whether or not a program meets the designated threshold, provided the credentialing examination(s), or alternative examination(s) offered by the same credentialing organization, is (are) available to be administered prior to graduation from the program. Results from said alternative examination(s) may be accepted, if designated as equivalent by the organization whose credentialing examination(s) is (are) so accredited.

2. Outcomes Reporting

The program must periodically submit to the JRC-DMS the program goal(s), learning domains, evaluation systems (including type, cut score, and appropriateness), outcomes, its analysis of the outcomes, and an appropriate action plan based on the analysis.

Programs not meeting the established thresholds must begin a dialogue with the JRC-DMS to develop an appropriate plan of action to respond to the identified shortcomings.

V. Fair Practices

A. Publications and Disclosure

1. Announcements, catalogs, publications, and advertising must accurately reflect the program offered.

2. At least the following must be made known to all applicants and students: the sponsor's institutional and programmatic accreditation status as well as the name, mailing address, web site address, and phone number of the accrediting agencies; admissions policies and practices, including technical standards (when used); policies on advanced placement, transfer of credits, and credits for experiential learning; number of credits required for completion of the program; tuition/fees and other costs required to complete the program; policies and processes for withdrawal and for refunds of tuition/fees.

3. At least the following must be made known to all students: academic calendar, student grievance procedure, criteria for successful completion of each segment of the curriculum and graduation, policies for student leave of absence, exposure to bloodborne pathogens, communicable diseases, and pregnancy, and policies and processes by which students may perform clinical work while enrolled in the program.

4. The sponsor must maintain, and make available to the public, current and consistent summary information about student/graduate achievement that includes the results of one or more of the outcomes assessments required in these Standards.

The sponsor should develop a suitable means of communicating to the communities of interest the achievement of students/graduates (e.g. through a website or electronic or printed documents).

B. Lawful and Non-discriminatory Practices

All activities associated with the program, including student and faculty recruitment, student admission, and faculty employment practices, must be non-discriminatory and in accordance with federal and state statutes, rules, and regulations. There must be a faculty grievance procedure made known to all paid faculty.

A procedure should be established for determining that a student's health will permit him or her to meet the documented technical standards of the program.

C. Safeguards

The health and safety of patients, students, and faculty, and other participants associated with the educational activities of the students must be adequately safeguarded.

All activities required in the program must be educational and students must not be substituted for staff.

Diagnostic medical sonography students must be readily identifiable to patients and clinical co-workers as diagnostic medical sonography students.

The program must ensure voluntary and prudent use of students or other human subjects for non-clinical scanning. Students' grades and evaluations must not be affected by participation or non-participation.

D. Student Records

Satisfactory records must be maintained for student admission, advisement, counseling, and evaluation. Grades and credits for courses must be recorded on the student transcript and permanently maintained by the sponsor in a safe and accessible location.

E. Substantive Change

The sponsor must report substantive change(s) as described in Appendix A to CAAHEP/JRC-DMS in a timely manner. Other substantive change(s) to be reported to JRC-DMS within the time limits prescribed include:

1. Added or deleted learning concentrations
2. Change in award (certificate, diploma, degree) granted at the completion of the program
3. Change in clock or credit hours for completion of a program
4. Change in the length of a program
5. Change in location or method of delivery of curriculum (ex: satellite campus, distance education)

F. Agreements

There must be a formal affiliation agreement or memorandum of understanding between the sponsor and all other entities that participate in the education of the students describing the relationship, role, and responsibilities between the sponsor and that entity.

The delineation of responsibilities should include student supervision, benefits, liability and financial arrangements, if any. The agreement should include a clause to protect students and to ensure due process.

An affiliate is an institution having adequate resources to provide a broad range of appropriate clinical education opportunities for students.

A clinical education center is a department, division, or other designated part of a clinical affiliate having adequate resources to provide clinical education opportunities for students. Multiple clinical education centers may be identified within a clinical affiliate.

APPENDIX A

Application, Maintenance and Administration of Accreditation

A. Program and Sponsor Responsibilities

1. Applying for Initial Accreditation

a. The chief executive officer or an officially designated representative of the sponsor completes a "Request for Accreditation Services" form The "Request for Accreditation Services" form can be found online via the CAAHEP website. The form can be completed on-line and submitted directly to the JRC-DMS via the CAAHEP website (preferred); completed on-line, printed, signed and mailed to the JRC-DMS; or it can be printed as a blank form, completed, signed and mailed to:

JRC-DMS
6021 University Blvd. Suite 500
Ellicott City, MD 21043

Note: There is **no** CAAHEP fee when applying for accreditation services; however, individual committees on accreditation may have an application fee.

b. The program undergoes a comprehensive review, which includes a written self-study report and an on-site review.

The self-study instructions and report form are available from the JRC-DMS. The on-site review will be scheduled in cooperation with the program and JRC-DMS once the self-study report has been completed, submitted, and accepted by the JRC-DMS.

2. Applying for Continuing Accreditation

a. Upon written notice from the JRC-DMS, the chief executive officer or an officially designated representative of the sponsor completes a "Request for Accreditation Services" form.

The "Request for Accreditation Services" form can be found online via the CAAHEP website. The form can be completed on-line and submitted directly to the JRC-DMS via the CAAHEP website (preferred); completed on-line, printed, signed and mailed to the JRC-DMS; or it can be printed as a blank form, completed, signed and mailed to:

JRC-DMS
6021 University Blvd. Suite 500
Ellicott City, MD 21043

b. The program may undergo a comprehensive review in accordance with the policies and procedures of the JRC-DMS.

If it is determined that there were significant concerns with the on-site review, the sponsor may request a second site visit with a different team.

After the on-site review team submits a report of its findings, the sponsor is provided the opportunity to comment in writing and to correct factual errors prior to the JRC-DMS forwarding a recommendation to CAAHEP.

3. Administrative Requirements for Maintaining Accreditation

a. The program must inform the JRC-DMS and CAAHEP within a reasonable period of time (as defined by JRC-DMS and CAAHEP policies) of changes in chief executive officer, dean of health professions or equivalent position, and required program personnel.

b. The sponsor must inform CAAHEP and the JRC-DMS of its intent to transfer program sponsorship. To begin the process for a Transfer of Sponsorship, the current sponsor must submit a letter (signed by the CEO or designated individual) to CAAHEP and the JRC-DMS that it is relinquishing its sponsorship of the program. Additionally, the new sponsor must submit a "Request for Transfer of Sponsorship Services" form. The JRC-DMS has the discretion of requesting a new self-study report with or without an on-site review. Applying for a transfer of sponsorship does not guarantee that the transfer will be granted.

c. The sponsor must promptly inform CAAHEP and the JRC-DMS of any adverse decision affecting its accreditation by recognized institutional accrediting agencies and/or state agencies (or their equivalent).

d. Comprehensive reviews are scheduled by the JRC-DMS in accordance with its policies and procedures. The time between comprehensive reviews is determined by the JRC-DMS and based on the program's on-going compliance with the Standards, however, all programs must undergo a comprehensive review at least once every ten years.

e. The program and the sponsor must pay JRC-DMS and CAAHEP fees within a reasonable period of time, as determined by the JRC-DMS and CAAHEP respectively.

f. The sponsor must file all reports in a timely manner (self-study report, progress reports, annual reports, etc.) in accordance with JRC-DMS policy.

g. The sponsor must agree to a reasonable on-site review date that provides sufficient time for CAAHEP to act on a JRC-DMS accreditation recommendation prior to the "next comprehensive review" period, which was designated by CAAHEP at the time of its last accreditation action, or a reasonable date otherwise designated by the JRC-DMS.

Failure to meet any of the aforementioned administrative requirements may lead to administrative probation and ultimately to the withdrawal of accreditation. CAAHEP will immediately rescind administrative probation once all administrative deficiencies have been rectified.

4. Voluntary Withdrawal of a CAAHEP- Accredited Program

Voluntary withdrawal of accreditation from CAAHEP may be requested at any time by the Chief Executive Officer or an officially designated representative of the sponsor writing to CAAHEP indicating: the desired effective date of the voluntary withdrawal, and the location where all records will be kept for students who have completed the program.

5. Requesting Inactive Status of a CAAHEP- Accredited Program

Inactive status may be requested from CAAHEP at any time by the Chief Executive Officer or an officially designated representative of the sponsor writing to CAAHEP indicating the desired date to become inactive. No students can be enrolled or matriculated in the program at any time during the time period in which the program is on inactive status. The maximum period for inactive status is two years. The sponsor must continue to pay all required fees to the JRC-DMS and CAAHEP to maintain its accreditation status.

To reactivate the program the Chief Executive Officer or an officially designated representative of the sponsor must notify CAAHEP of its intent to do so in writing to both CAAHEP and the JRC-DMS. The sponsor will be notified by the JRC-DMS of additional requirements, if any, that must be met to restore active status.

If the sponsor has not notified CAAHEP of its intent to re-activate a program by the end of the two-year period, CAAHEP will consider this a "Voluntary Withdrawal of Accreditation."

B. CAAHEP and Committee on Accreditation Responsibilities – Accreditation Recommendation Process

1. After a program has had the opportunity to comment in writing and to correct factual errors on the on-site review report, the JRC-DMS forwards a status of public recognition recommendation to the CAAHEP Board of Directors. The recommendation may be for any of the following statuses: initial accreditation, continuing accreditation, transfer of sponsorship, probationary accreditation, withhold accreditation, or withdraw accreditation.

   The decision of the CAAHEP Board of Directors is provided in writing to the sponsor immediately following the CAAHEP meeting at which the program was reviewed and voted upon.

2. Before the JRC-DMS forwards a recommendation to CAAHEP that a program be placed on probationary accreditation, the sponsor must have the opportunity to request reconsideration of that recommendation or to request voluntary withdrawal of accreditation. The JRC-DMS reconsideration of a recommendation for probationary accreditation must be based on conditions existing both when the committee arrived at its recommendation as well as on subsequent documented evidence of corrected deficiencies provided by the sponsor.

The CAAHEP Board of Directors' decision to confer probationary accreditation is not subject to appeal.

3. Before the JRC-DMS forwards a recommendation to CAAHEP that a program's accreditation be withdrawn or that accreditation be withheld, the sponsor must have the opportunity to request reconsideration of the recommendation, or to request voluntary withdrawal of accreditation or withdrawal of the accreditation application, whichever is applicable. The JRC-DMS reconsideration of a recommendation of withdraw or withhold accreditation must be based on conditions existing both when the JRC-DMS arrived at its recommendation as well as on subsequent documented evidence of corrected deficiencies provided by the sponsor.

   The CAAHEP Board of Directors' decision to withdraw or withhold accreditation may be appealed. A copy of the CAAHEP "Appeal of Adverse Accreditation Actions" is enclosed with the CAAHEP letter notifying the sponsor of either of these actions.

   At the completion of due process, when accreditation is withheld or withdrawn, the sponsor's Chief Executive Officer is provided with a statement of each deficiency. Programs are eligible to re-apply for accreditation once the sponsor believes that the program is in compliance with the accreditation *Standards*.

   Any student who completes a program that was accredited by CAAHEP at any time during his/her matriculation is deemed by CAAHEP to be a graduate of a CAAHEP-accredited program.

Appendix B
Curriculum for Educational Programs in Diagnostic Medical Sonography

The curricular requirements are designed to demonstrate and assess knowledge progressively from general education requisite content, common core, and concentration-specific theory through clinical competency in preparation to become a competent entry-level sonographer. Clinical competency requirements must be assessed in a diagnostic clinical affiliate.

Demonstration of knowledge may be assessed and documented in a variety of ways. Methods for assessment may include, but not limited to, written exams, assignments, or lab activities. Documentation of proficiency in scan techniques may occur in the simulated lab environment or diagnostic clinical setting.

1. General Education Curriculum

Basic medical science and interpersonal communication education is required as a foundation for the clinical role of the diagnostic medical sonographer. The following must be at the post-secondary/college-level education courses:

a. Communication
b. Human anatomy and physiology
c. Mathematics
d. Physics

The program and sponsor may determine which mathematics and physics, including applied physics, courses will meet its needs and yield the outcomes desired of their graduates.

2. Learning Competencies Common to All Concentrations

a. Demonstrate knowledge and application of ergonomic techniques.

1) Industry standards and OSHA guidelines
2) Types of work-related musculoskeletal disorders
3) Role of Administration in the prevention of MSI
4) Role of Sonographer in the prevention of MSI
5) Best practices for prevention
    a) Daily exercises in the workplace
    b) Neutral posture
    c) Patient transfer and assistance
    d) Patient positioning
    e) Equipment and accessories
    f) Supports, tools, and devices
    g) Transducer grip and pressure
    h) Schedules/Workload
    i) Workstation/work area(s)

b. Demonstrate knowledge and application of types and methods of infection control.

1) Personal and patient
    a) Standard precautions
    b) Isolation procedures
    c) Aseptic and sterile technique
2) Environment
    a) Equipment
    b) Transducer cleaning and disinfection
    c) Accessories

c. Demonstrate knowledge and application of patient care.

1) Compliance with program and clinical education facility policies and procedures
2) Patient Care Partnership

3) Patient directives
4) Anticipate and be able to respond to the needs of the patient
    a) Demonstrate age-related and cultural competency
    b) Demonstrate appropriate patient care in settings outside of the sonography department.
5) Transport and transfer of patients with support equipment
    a) Oxygen
    b) Intravenous lines/pumps
    c) Urinary catheters
    d) Drainage tubes
6) Vital signs
7) Color
8) Skin integrity
9) Clinical history
10) Proper patient positioning and draping
11) Comfort
12) Privacy
13) IV insertion and injection with use of contrast-enhanced imaging
14) Basic pharmacology as related to the concentration
15) Post interventional procedure care and discharge
16) Life-threatening situations and implement emergency care as permitted by institutional policy, including the following:
    a) Pertinent patient care procedures
    b) Principles of psychological support
    c) Emergency conditions and procedures
    d) First aid and resuscitation techniques
17) Reporting and documentation of incidents and/or adverse reactions

d. Demonstrate knowledge of the roles and responsibilities of healthcare professions to effectively communicate and collaborate in the healthcare environment.
1) Team development
2) Conflict resolution
3) Interprofessional communication and education

e. Demonstrate knowledge of medical ethics and law.
1) Patient's right to privacy based on applicable legal and regulatory standards
2) HIPAA
3) Electronic documentation and transmission
4) Terminology related to ethics, values, and morals
5) Types of law
6) Risk management
7) Medical malpractice liability coverage
8) Informed consent
9) Documentation of clinical incidents
10) Professional scope of practice and clinical standards
11) Professional code of ethics

f. Demonstrate knowledge of medical and sonographic terminology.
1) Definitions, abbreviations, symbols, terms, and phrases
2) Correlating diagnostic and imaging procedures
3) Sonographic appearances

g. Obtain, evaluate, document, and communicate relevant information related to sonographic examinations.
1) Clinical information and historical facts from the patient and the medical records, which may impact the diagnostic examination.
    a) Clinical signs and symptoms
    b) Laboratory tests
    c) Imaging and diagnostic procedures

d) Oral and/or written summary of sonographic findings.
2) Deviation from practice parameters for the sonographic examination as required by patient history or initial findings
3) Changes from a previous examination
4) Examination findings that require an immediate clinical response and notify the interpreting physician.

h. Identify and evaluate anatomic structures.
1) Sectional anatomy
2) Relational anatomy
3) Normal sonographic appearances of organs, muscles, tissue, vascular and skeletal structures
4) Differentiation of normal from abnormal sonographic findings

i. Demonstrate knowledge of disease processes with application to sonographic and Doppler patterns.
1) Iatrogenic
2) Degenerative
3) Inflammatory
4) Traumatic
5) Neoplastic
6) Infectious
7) Obstructive
8) Congenital
9) Metabolic
10) Immunologic

j. Demonstrate knowledge and application of image production and optimization.
1) Sound production and propagation
2) Interaction of sound and matter
3) Instrument options and transducer selection
4) Principles of ultrasound instruments and modes of operation
5) Operator control options
6) Physics of Doppler
7) Principles of Doppler techniques
8) Methods of Doppler flow analysis
9) Hemodynamics of blood flow
10) Contrast-enhanced imaging
11) Acoustic artifacts
12) Emerging technologies
13) Image storage devices

k. Demonstrate knowledge and application of biological effects.
1) In-vitro and in-vivo ultrasound effects
2) Exposure/equipment display indices
3) Generally accepted maximum safe exposure levels
4) ALARA principle
a) Mechanisms that affect the mechanical and thermal indices
b) Techniques to decrease the mechanical and thermal indices

l. Demonstrate knowledge of a quality control and improvement program.
1) Lab accreditation
2) Credentialing organizations
3) Equipment operation and maintenance
a) Phantom testing
b) Records maintenance

m. Demonstrate awareness of resources for professional development.
1) Professional organizations and resources

2) Professional journals and on-line resources
3) Continuing education conferences
4) Clinical conferences, lectures, and in-house educational offerings
5) Recent developments in sonography
6) Research statistics and design

n. Demonstrate achievement of clinical competency through the performance of the requirements to provide quality patient care and optimal examination outcome. Clinical competencies must include evaluation and documentation of:
1) Use of proper ergonomics
2) Safety and infection control
3) Obtain clinical history and utilize information appropriately
4) Oral and written communication
5) Image optimization techniques
6) ALARA
7) Professionalism
8) Document sonographic findings for communication with interpreting physician
9) Finalize examination for permanent storage
10) Process for reporting of critical findings

The above competencies may be embedded within the learning concentration clinical competencies.

3. Learning Competencies for the Abdominal Sonography - Extended Concentration

a. **Identify anatomy, relational anatomy, anatomic variants, and sonographic appearances of normal anatomical structures.**
1) Abdominal
a) Abdominal wall
b) Adrenal glands
c) Aorta and branches
d) Biliary system
e) Gastrointestinal tract
f) Great vessels and branches
g) Liver
h) Lung/pleura
i) Lymphatic system
j) Pancreas
k) Peritoneal and retroperitoneal cavities
l) Spleen
m) Urinary tract

2) Extended
a) Extremity non-vascular
b) Infant hips
c) Neck
d) Neonatal/infant head
e) Neonatal/infant spine
f) Penis
g) Prostate
h) Scrotum
i) Superficial soft-tissue structures

b. Demonstrate knowledge of the physiology, pathophysiology, sonographic technique, measurements, sonographic appearances, and Doppler patterns, where applicable, in both normal and abnormal structures.
1) Abdominal
a) Abdominal wall
b) Adrenal glands

c) Aorta and branches
d) Biliary system
e) Gastrointestinal tract
f) Great vessels and branches
g) Liver
h) Lung/pleura
i) Lymphatic system
j) Pancreas
k) Peritoneal and retroperitoneal cavities
l) Spleen
m) Urinary tract

2) Extended
a) Extremity non-vascular
b) Infant hips
c) Neck
d) Neonatal/infant head
e) Neonatal/infant spine
f) Penis
g) Prostate
h) Scrotum
i) Superficial soft-tissue structures

c. Demonstrate knowledge in sonographic guided procedures.
1) Role of sonographer
2) Clinical information
3) Informed consent
4) Procedural time out
5) Transducer guidance
6) Sterile setup
7) Pre-and post-procedural documentation

d. Evaluate scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses.
1) Indications and contraindications
2) History and physical examination
3) Related imaging, laboratory, and functional testing procedures
4) Clinical differential diagnosis
5) Contrast-enhanced imaging
6) Role of sonography in patient management

e. Document proficiency in the scanning technique and application for:
1) Abdominal vascular Doppler assessment
a) Hepatic
b) Mesenteric
c) Renal
2) Gastrointestinal tract assessment

The above proficiencies may be demonstrated in a clinical setting or in a simulated environment.

f. Demonstrate achievement of clinical competency through the performance of sonographic examinations of the abdomen and superficial structures, according to practice parameters established by national professional organizations and the protocol of the clinical affiliate. Clinical competencies must include evaluation and documentation of:
1) Identification of anatomical and relational structures
2) Differentiation of normal from pathological/disease process
3) Image optimization techniques in grayscale
4) Image optimization techniques in Doppler (where applicable)

5) Measurement techniques
6) Abdominal competencies
    a) Complete abdominal examination
    b) Limited abdominal examination
        (1) Aorta/IVC
        (2) Biliary system
        (3) Liver
        (4) Pancreas
        (5) Spleen
        (6) Kidneys
        (7) Bladder
        (8) Pleural space
        (9) Sonographic guided procedure (assistance)
7) Superficial Structures
    a) Thyroid
    b) Scrotum

The above structures listed under limited abdominal examination may be completed as individual clinical competencies or may be incorporated with other structures/techniques as part of a limited or complete examination.

4. Learning Competencies for the Adult Cardiac Sonography Concentration

a. Identify anatomy, anatomic variants, and sonographic appearances of normal cardiac structures.

1) Embryology and fetal cardiac development
2) Cardiac chambers and septation
3) Coronary artery anatomy and distribution
4) Pulmonary artery and venous return
5) Relationships of cardiac chambers and great vessels
6) Valve anatomy and function

b. Demonstrate knowledge of normal and cardiovascular physiology and hemodynamics.

1) Ventricular systolic and diastolic function, including the influence of loading conditions, filling pressures, normal intracardiac pressures, and measurement of cardiac output
2) Electrophysiology and exercise physiology

c. Demonstrate knowledge of mechanisms of disease, cardiovascular pathophysiology, and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in both the normal heart and with cardiac disease.

1) Valvular heart disease
2) Prosthetic heart valves
3) Ventricular dysfunction
4) Diastolic dysfunction
5) Ischemic cardiac disease
6) Cardiomyopathy
7) Pericardial disease
8) Congenital heart disease
9) Endocarditis, neoplasms, and masses
10) Cardiac trauma
11) Pulmonary vascular disease
12) Diseases of the aorta and great vessels
13) Cardiac assist devices
14) Intracardiac devices
15) Heart transplant
16) Intracardiac shunt
17) Intracardiac pressures
18) Cardio-oncology
19) Systemic diseases

20) Systemic and pulmonary hypertension
21) Common arrhythmias and conduction abnormalities

d. Demonstrate knowledge of the indications, utility, limitations, and technical procedures for related echocardiographic studies.
1) Transthoracic echocardiography
2) Stress echocardiography
3) Transesophageal echocardiography
4) Intraoperative echocardiography
5) Enhanced cardiac ultrasound
6) IV administration techniques
7) Three-dimensional echocardiography
8) Echo-guided procedures
9) Strain echocardiography
10) Speckle tracking
11) Cardiac ultrasound respirogram
12) Pharmacology

e. Demonstrate knowledge, application, and proficiency in the use of quantitation principles applied to echocardiographic images and flow data.
1) Standard M-mode, two-dimensional, and Doppler measurements and calculations
2) Knowledge and understanding of normal and abnormal values for M-mode, two-dimensional and Doppler echocardiography
3) Evaluation of normal and abnormal systolic and diastolic ventricular function
4) Evaluation of the severity of valve stenosis and regurgitation
5) Evaluation of normal and abnormal prosthetic valves, assist devices and interventional procedures

f. Awareness of scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses.
1) Indications and contraindications
2) History and physical examination
3) Related imaging, laboratory, and functional testing procedures
   a) Chest X-ray
   b) Angiography and cardiac catheterization
   c) Electrocardiography, electrophysiologic studies, Holter monitoring
   d) Stress testing protocols
   e) Radionuclide studies
   f) Cross-sectional imaging procedures
   g) Adult interventions
4) Clinical differential diagnosis
5) Role of sonography in patient management
6) Effects of pharmacotherapy on echocardiographic findings

g. Demonstrate proficiency in technique and application of:
1) Quantitative principles applied to echocardiographic images and flow data
2) Stress echocardiography – exercise
3) Stress echocardiography – pharmacologic
4) Transthoracic enhanced echocardiogram

The above proficiencies may be demonstrated in a clinical setting or in a simulated environment.

h. Demonstrate achievement of clinical competency through the performance of adult cardiac sonography, according to practice parameters established by national professional organizations and the protocol of the clinical affiliate. Clinical competencies must include evaluation and documentation of:
1) Identification of anatomical and relational structures
2) Differentiation of normal from pathological/disease process
3) Image optimization and measurement techniques with:

a) 2D imaging
b) M-mode
c) Spectral Doppler: PW, CW and Tissue Doppler
d) Color flow Doppler
e) Use of non-imaging CW Doppler transducer

4) Adult cardiac sonography competencies
   a) Complete transthoracic echocardiogram – Normal
   b) Systolic dysfunction
   c) Diastolic dysfunction
   d) Aortic valve or aortic root pathology
   e) Mitral valve pathology
   f) Right heart pathology
   g) Cardiomyopathy
   h) Pericardial pathology
   i) Prosthetic valve
   j) Coronary artery disease
   k) Contrast-enhanced echocardiography (observe)

The above may be completed as individual clinical competencies or may be incorporated with other organs as part of a limited or complete examination.

5. Learning Competencies for the Breast Sonography Concentration

a. Identify anatomy, congenital and developmental variants, and sonographic appearances of normal breast structures.

1) Areolar complex/nipple
2) Fibrous planes
   a) Skin
   b) Subcutaneous fat
   c) Mammary zone
   d) Retromammary space
   e) Muscle layers
   f) Rib cage and intercostal muscles
3) Cooper's ligaments
4) Ductal system
5) Lymph nodes
6) Vasculature
   a) Arterial
   b) Venous
7) Variants
   a) Amastia
   b) Amazia
   c) Athelia
   d) Polymastia
   e) Polythelia
   f) Nipple inversion/flattening
   g) Early ripening
   h) Age-related sonographic changes of breast tissue and its components

b. Demonstrate knowledge of physiology and pathophysiology in both normal and abnormal breast structures.

1) Embryologic development
2) Age-related development of the breast to involution
3) Normal blood flow patterns within the breast and its components
4) Lymphatic drainage
5) Effect of pregnancy
6) Lactation
7) Male breast
8) Infectious processes

9) Neoplasms
    a) Cystic
    b) Benign
    c) Malignant
10) Trauma

c. Demonstrate knowledge of the sonographic technique, measurements, sonographic appearances, integration of data, and Doppler patterns in both normal and abnormal breast structures.

1) Scan planes
2) Scan techniques
3) Patient position
4) Imaging techniques
5) Image labeling/distance from nipple
6) Image optimization
7) Artifacts
8) Implants
9) Lymph node assessment
10) Postoperative biopsy site
11) BI-RADS assessment categories
12) Correlation of other imaging modalities
13) Spectral Doppler of the vasculature related to a mass
14) Color Doppler of a mass/lesion
15) Power Doppler of a mass/lesion

d. Demonstrate knowledge in interventional and intraoperative procedures.

1) Role of sonographer in ultrasound-guided procedures and sentinel lymph node biopsy
2) Clinical information
3) Informed consent
4) Procedural time out
5) Transducer guidance
6) Sterile setup
7) Pre-and post-procedural documentation
8) Sonography assisted procedures

e. Evaluate scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses.

1) Indications and contraindications
2) History and physical examination
3) Related imaging, laboratory, and functional testing procedures
    a) Correlation with mammography
    b) BIRADS
    c) Correlation with MRI
    d) Correlation with Nuclear Medicine
4) Clinical differential diagnosis
5) Role of sonography in patient management
6) Elastography
7) Role of three-dimensional sonography

f. Demonstrate knowledge of treatment options.

1) Medical
2) Surgical
3) Brachytherapy

g. Demonstrate achievement of clinical competency through the performance of sonographic examinations of the breast, according to practice parameters established by national professional organizations and the protocol of the clinical affiliate/clinical education centers. Clinical competencies must include evaluation and documentation of:

1) Identification of anatomical and relational structures

2) Differentiation of normal from pathological/disease process
3) Image optimization techniques in grayscale
4) Image optimization techniques in Doppler (where applicable)
5) Measurement techniques (where applicable)
6) Breast competencies
   a) Targeted exam
   b) Lymph node evaluation
   c) Cystic lesion
   d) Solid lesion
   e) Doppler evaluation of mass
   f) Implant
   g) Breast interventional procedures
(1) Fine needle aspiration
(2) Core biopsy
(3) Needle localization

The above may be completed as individual clinical competencies or may be incorporated with other structures/techniques as part of a limited or complete examination.

6. Learning Competencies for the Musculoskeletal Sonography Concentration

a. Define and describe the sonographic characteristics of the components of the musculoskeletal system.
1) Bursae
2) Cartilage
3) Fascia
4) Fat pads
5) Ligaments
6) Muscles
7) Retinaculum
8) Tendons
9) Nerves
10) Lymph nodes
11) Types of joints

b. Demonstrate knowledge of the anisotropic effect and the ability to distinguish this artifact from normal variants and pathology.

c. **Identify anatomical structures, nerves and vascular supply, normal sonographic appearances, normal Doppler patterns, measurements (and contralateral comparison when applicable), and changes with the dynamic assessment.**
1) Abdominal wall
2) Shoulder
3) Upper arm
4) Elbow
5) Forearm
6) Wrist
7) Hands
8) Fingers
9) Hip, to include groin and pelvis
10) Upper leg
11) Knee
12) Lower leg
13) Ankle
14) Foot
15) Toes

d. Demonstrate knowledge of the physiology, pathophysiology, sonographic technique, measurements, sonographic appearances, and Doppler patterns in musculoskeletal injuries and disease processes.

1) Abdominal wall
2) Shoulder
3) Upper arm
4) Elbow
5) Forearm
6) Wrist
7) Hands
8) Fingers
9) Hip, to include groin and pelvis
10) Upper leg
11) Knee
12) Lower leg
13) Ankle
14) Foot
15) Toes

e. Identify sonographic and Doppler patterns in clinical diseases, injury, and post-surgical changes that may occur in the following categories.

1) Bone pathology
2) Cartilage
3) Crystal deposits
4) Cystic structures
5) Fluid collections
6) Foreign bodies
7) Hernias
8) Infections
9) Joint effusions
10) Joint laxity/altered function
11) Ligament pathology and tears
12) Masses/neoplastic processes
13) Muscle pathology and tears
14) Neuromas
15) Nerve pathology and entrapment
16) Soft tissue pathology
17) Subcutaneous abnormalities
18) Synovitis
19) Synovial proliferation
20) Tendon pathology, tears, and calcifications
21) Vascular malformations

f. Demonstrate knowledge in sonographic guided procedures

1) Role of sonographer
2) Clinical information
3) Informed consent
4) Procedural time out
5) Transducer guidance
6) Sterile setup
7) Pre-and post-procedural documentation
8) Procedures
    a) Ablation
    b) Aspiration
    c) Platelet-Rich Plasma (PRP) Injection
    d) Dry needling
    e) Biopsy
    f) Nerve mapping
    g) Nerve block

h) Surgical planning

g. Evaluate scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses

1) Indications and contraindications
2) History and physical examination
3) Related imaging, laboratory, and functional testing procedures
4) Clinical differential diagnosis
5) Role of sonography in patient management

h. Demonstrate achievement of clinical competency through the performance of sonographic examinations of the musculoskeletal system, according to practice parameters established by national professional organizations and the protocol of the clinical affiliate. **Clinical competencies must include evaluation and documentation of:**

1. Identification of anatomical and relational structures
2. Differentiation of normal from pathological/disease process
3. Image optimization techniques in grayscale
4. Image optimization techniques in Doppler (where applicable)
5. Dynamic or provocative maneuvers
6. Evaluate bony surface irregularities (where applicable)
    a) Abdominal wall
        (1) Valsalva maneuver to assess for ventral hernia
    b) Shoulder
        (1) Biceps subluxation – Rotate arm in external and internal rotation
        (2) Supraspinatus impingement – Arm abduction
        (3) Acromioclavicular joint – Cross-arm maneuver
        (4) Posterior labrum – Rotate arm in external and internal rotation
    c) Elbow
        (1) Ulnar nerve subluxation—Flexion and extension
        (2) Ulnotrochlear joint--Valgus stress
        (3) Radiocapitellar joint – Varus stress
        (4) Extensor carpi ulnaris (ECU) subluxation – Pronation to supination
    d) Hands and fingers
        (1) Trigger finger—Flexion & extension
        (2) Stenner lesion—Valgus stress of ulnar collateral ligament
    e) Hip, to include groin and pelvis
        (1) Valsalva maneuver when to assess for inguinal or femoral hernia
        (2) Iliopsoas snapping—hip flexion with external rotation and abduction followed by hip extension and internal rotation
        (3) Iliotibial band snapping—hip flexion and extension or symptom-driven dynamic maneuver
    f) Knee
        (1) Anterior – Flexion and extension to evaluate the patellar tendon
        (2) Lateral – Lateral compartment joint space
        (3) Ankle
        (4) Lateral – Peroneal tendon subluxation evaluation during eversion circumduction
        (5) Medial – Dorsiflexion and inversion to check for tibialis posterior tendon instability
        (6) Posterior – Dorsiflexion/plantar flexion to evaluate the Achilles tendon
    g) Foot
        (1) Dorsiflex the 2-4 metatarsophalageal joint (MTP) to evaluate tendon movement, the integrity of the plantar plate, and for plantar tears
    h) Neuromuscular
        (1) Peripheral neuropathies
        (2) Compression disorders

The above may be completed as individual clinical competencies or may be incorporated with other structures/techniques as part of a limited or complete examination.

7. Learning Competencies for the Obstetrics and Gynecology Sonography Concentration

a. Identify anatomy, anatomic variants, and sonographic appearances of normal structures of the female pelvis.

1) Pelvic muscles
2) Pelvic vasculature
3) Peritoneal spaces
4) Reproductive organs
5) Suspensory ligaments

b. Identify anatomy, anatomic variants, and sonographic appearances of normal maternal, embryonic, and fetal anatomic structures during the first, second, and third trimesters.

1) First-trimester structures

a) Gestational sac
b) Embryonic pole
c) Yolk sac
d) Early placenta
e) Fetal cardiac activity
f) Uterus
g) Cervix
h) Adnexa
i) Pelvic spaces
j) Multiple gestations

2) Second- and Third-trimester fetal and maternal structures

a) Intracranial anatomy
b) Face
c) Thoracic cavity
d) Heart
   (1) Position and size
   (2) Four-chamber view
   (3) LVOT and RVOT views
   (4) Three-vessel and three-vessel tracheal views
e) Abdomen and pelvis
f) Abdominal wall
g) Spine
h) Extremities
i) External genitalia
j) Amniotic fluid
k) Placenta
l) Umbilical cord
m) Fetal cardiac activity
n) Maternal cervix
o) Maternal adnexa
p) Multiple gestations

c. Demonstrate knowledge of pathology, physiology, pathophysiology, sonographic technique, measurements, sonographic appearances, and Doppler patterns in gynecologic disease processes.

1) Inflammatory processes
2) Congenital anomalies
3) Benign uterine/adnexal masses
4) Malignant uterine/adnexal masses
5) Contraceptive devices
6) Infertility procedures
7) Post-partum

d. Demonstrate knowledge of pathology, physiology, pathophysiology, sonographic technique, sonographic appearance, measurements, and Doppler patterns in obstetric abnormalities.

1) First trimester complications
2) Congenital anomalies
3) Genetic syndromes
4) Growth abnormalities
5) Multiple gestation complications
6) Viability
7) Amniotic fluid
8) Placenta
9) Umbilical cord
10) Fetal monitoring
11) Effects of maternal conditions

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

1) Infertility procedures
2) Amniocentesis
3) Chorionic villus sampling
4) Fetal therapy
5) Nuchal translucency
6) Sonohysterography
7) Three-dimensional obstetric and gynecologic sonography

f. Evaluate scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses.

1) Indications and contraindications
2) History and physical examination
3) Related imaging, laboratory, and functional testing procedures
4) Clinical differential diagnosis
5) Role of sonography in patient management

g. Demonstrate achievement of clinical competency through the performance of sonographic examinations of the gravid and non-gravid pelvis with both transabdominal and endocavitary transducers, and Doppler/M-mode display modes, according to practice parameters established by national professional organizations and the protocol of the clinical affiliate. Clinical competencies must include evaluation and documentation of:

1) Identification of anatomical and related structures
2) Differentiation of normal from pathological/disease process
3) Image optimization techniques in grayscale
4) Image optimization techniques in Doppler and M-mode (where applicable)
5) Knowledge and application of ALARA
6) Measurements as applicable
7) Gynecology competencies
    a) Complete pelvic sonogram
    b) Vagina/cervix/uterus
    c) Posterior and anterior cul-de-sac
    d) Adnexa, including ovaries and fallopian tubes
8) Obstetrical competencies
    a) First-trimester obstetric structures:
        (1) Gestational sac
        (2) Embryonic pole
        (3) Yolk sac
        (4) Fetal cardiac activity
        (5) Placenta
        (6) Uterus
        (7) Cervix

(8) Adnexa
(9) Pelvic spaces

b) Second- and Third-trimester fetal and maternal structures
(1) Intracranial anatomy
(2) Face
(3) Thoracic cavity
(4) Heart
(a) Position and size
(b) Four-chamber view
(c) LVOT and RVOT views
(d) Three-vessel and three-vessel tracheal views
(5) Abdomen
(6) Abdominal wall
(7) Spine
(8) Extremities
(9) Amniotic fluid
(10) Placenta
(11) Umbilical cord
(12) Fetal cardiac activity
(13) Maternal cervical length
(14) Maternal adnexa

c) Biophysical profile

The above may be completed as individual clinical competencies or may be incorporated with other structures/techniques as part of a limited or complete examination.

8. Learning Competencies for the Pediatric Cardiac Sonography Concentration

a. Identify anatomy, anatomic variants, and sonographic appearances of normal and abnormal cardiac structures (adult, pediatric, and fetal).

1) Embryology and fetal cardiac development
2) Cardiac chambers and septation
3) Valve anatomy and dynamics
4) Coronary artery anatomy
5) Relationships of cardiac chambers and great vessels
6) Mediastinal structures
7) Arch anatomy
8) Pulmonary artery and venous anatomy
9) Systemic venous return

b. Demonstrate knowledge of normal cardiovascular physiology and hemodynamics.

1) Electrophysiology
2) Fetal circulation
3) Transitional physiology
4) Ventricular function
5) Pulmonary and systemic circulation
6) Exercise physiology

c. Demonstrate knowledge of cardiovascular pathophysiology (embryology of congenital abnormalities, mechanisms of acquired disease), and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in both the normal heart and with cardiac disease.

1) Congenital heart disease (CHD)
a) Situs abnormalities
b) Defects in cardiac septation
c) Abnormalities in atrial-ventricular connections
d) Ventricular hypoplasia
e) Ventricular Inflow anomalies
f) Abnormalities in ventriculoarterial connection

g) Ventricular outflow anomalies
h) Abnormalities within cardiac chambers
i) Vascular abnormalities
j) Abnormalities within thorax
k) Abnormal vascular connections
l) Postoperative repair/treatment
m) Diseases of the aorta and great vessels
n) Valvular abnormalities
o) Pericardial abnormalities

2) Acquired heart disease
a) Valvular heart disease
b) Ischemic cardiac disease
c) Cardiomyopathy
d) Pericardial disease
e) Cardiac endocarditis, neoplasms, and masses
f) Cardiac trauma
g) Pulmonary vascular disease
h) Systemic and pulmonary hypertension
i) Infection of native structures and devices

d. Demonstrate knowledge and applications of the indications, utility, limitations, and technical procedures for related echocardiographic studies.

1) Stress echocardiography
2) Transesophageal echocardiography
3) Intraoperative echocardiography
4) Contrast-enhanced ultrasound
5) IV administration techniques
6) Three-dimensional echocardiography
7) Echo-guided procedures
8) Strain echocardiography
9) Targeted obstetric exam

e. Demonstrate knowledge, application, and proficiency in the use of quantitation principles applied to echocardiographic images and flow data.

1) Standard M-mode, two-dimensional, and Doppler measurements and calculations (normalized based on body surface area, and/or other biometric measurements for the fetus)
2) Knowledge and understanding of normal and abnormal values for M-mode, two-dimensional and Doppler echocardiography
3) Evaluation of normal and abnormal systolic and diastolic ventricular function
4) Evaluation of the severity of valve stenosis and regurgitation
5) Knowledge of normal and abnormal sonographic appearances of peripheral vascular anatomy
6) Calculation of Qp:Qs ratio
7) Miscellaneous measurements specific to patient history

f. Demonstrate knowledge and application of clinical cardiology as appropriate to the fetus and patients with congenital heart disease (CHD).

1) Relationship of echocardiography to history and physical examination, including indications for echocardiography - diagnostic approach to CHD
2) Acquired heart disease and noncardiac disease and the effects of systemic diseases on cardiovascular anatomy and physiology
3) Differential diagnosis as it relates to the echocardiographic examination
4) Cardiac arrhythmias
5) Genetic syndromes and chromosomal anomalies associated with CHD
6) Cardiovascular surgery and interventional cardiology
7) Post-operative repair evaluation
8) Current trends of caring for the fetus, pediatric and adult patient with CHD

g. Awareness of scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses.

1) Indications and contraindications
2) History and physical examination
3) Related imaging, laboratory, and functional testing procedures
    a) Chest X-ray
    b) Angiography and cardiac catheterization
    c) Electrocardiography, electrophysiologic studies, Holter monitoring
    d) Stress testing
    e) Radionuclide studies
    f) Tomographic imaging procedures
    g) Fetal /Pediatric/Adult interventions for congenital heart disease
4) Clinical differential diagnosis
5) Role of sonography in patient management
6) Pharmacology

h. Demonstrate proficiency in the technique and application of:

1) Quantitation principles applied to echocardiographic images and flow data
2) Calculation of Qp:Qs ratio

The above proficiencies may be demonstrated in a clinical setting or in a simulated environment.

i. Demonstrate achievement of clinical competency through the performance of pediatric cardiac sonography according to practice parameters established by national professional organizations and the protocol of the clinical affiliate. Clinical competencies must include evaluation and documentation of:

1) Identification of anatomical and relational structures
2) Differentiation of normal from pathological/disease process
3) Image optimization and measurement techniques with:
    a) 2D imaging
    b) M-mode
    c) Spectral Doppler: PW, CW and Tissue Doppler
    d) Color flow Doppler
    e) Use of non-imaging CW Doppler transducer
4) Pediatric cardiac sonography competencies
    a) Complete transthoracic examination - Normal
    b) Patent foramen ovale or atrial septal defect
    c) Ventricular septal defect
    d) Patent ductus arteriosus
    e) Conotruncal defect (repaired or unrepaired)
    f) Left heart structural/valvular disease
    g) Right heart structural/valvular disease
    h) Repaired structural heart disease

The above may be completed as individual clinical competencies or may be incorporated with other organs as part of a limited or complete examination.

9. Learning Competencies for the Vascular Sonography Concentration

a. Demonstrate knowledge of anatomy and anatomic variants of the cardiovascular system.

1) Heart
    a) Chambers
    b) Valves
    c) Vessels
2) Pulmonary circulation
3) Vessel structure
    a) Arteries

b) Veins
c) Capillaries
4) Aorta and branches
5) Cerebrovascular
6) Hepatoportal venous
7) Mesenteric arterial system
8) Peripheral arterial
9) Peripheral venous
10) Renal vessels
11) Vena cava and iliac veins

b. Demonstrate knowledge of normal and abnormal peripheral vascular physiology and hemodynamics.

1) Principles of pressure, flow, and resistance
2) Pulsatile flow
3) Laminar and non-laminar flow patterns
4) Poiseuille's law
5) Bernoulli's principle
6) Reynold's number
7) Cardiac influence on flow
8) Occlusive diseases
9) Collateral circulation
10) Exercise and hyperemia
11) Systemic diseases and other conditions
12) Venous physiology, valve function, calf pump

c. Demonstrate knowledge of mechanisms of vascular diseases, vascular pathophysiology, and hemodynamic effects.

1) Aneurysm and pseudoaneurysm
2) Arterial embolism
3) Arteriovenous fistulae and shunts
4) Atherosclerosis
5) Congenital anomalies
6) Fibromuscular dysplasia
7) Genetic disorders
8) Iatrogenic injury
9) Infection
10) Intimal hyperplasia
11) Ischemia
12) Neoplasia
13) Organ transplantation
14) Pharmacologic alterations
15) Portal hypertension
16) Systemic hypertension
17) Trauma
18) Vascular entrapment and extrinsic compression
19) Vascular malformations
20) Vasculitis
21) Vasospastic disorders
22) Venous thromboembolism
23) Venous valvular disorders

d. Demonstrate knowledge of sonographic appearances, sonographic techniques, measurements, and Doppler flow characteristics in both normal and abnormal vascular structures.

1) Aorta and branches
2) Cerebrovascular
3) Hepatoportal venous
4) Mesenteric arterial system

5) Peripheral arterial
6) Peripheral venous
7) Renal vessels
8) Vena cava and iliac veins

e. Demonstrate knowledge of physiologic vascular testing principles and techniques.
1) Continuous-wave and pulse Doppler
2) Pressure measurements, including ankle/brachial index
3) Pneumoplethysmography (pulse volume recording)
4) Segmental pressure and waveform analysis
5) Exercise treadmill testing
6) Photoplethysmography (PPG), arterial and venous
7) Air plethysmography, venous
8) Laser Doppler, including skin perfusion pressure measurements

f. Demonstrate knowledge and application in the use of quantitative principles applied to vascular testing.
1) Acceleration time
2) Ankle/brachial pressure ratios
3) Aorta/renal ratios
4) Area and diameter reduction measurements
5) Digit/brachial indices
6) Velocity change across stenosis for grading arterial lesions
7) Pulsatility index
8) Resistive index
9) Segmental pressures, including digits
10) Velocity ratios
11) Venous reflux time
12) Volume flow

g. Demonstrate knowledge in ultrasound-guided procedures.
1) Role of sonographer
2) Clinical information
3) Informed consent
4) Procedural time out
5) Sterile technique
6) Pre- and post-procedure documentation
7) Superficial vein ablation
8) Use of thrombin injection for pseudoaneurysm treatment

h. Demonstrate knowledge of the role of ultrasound for evaluation of vascular surgical procedures or interventions, including a role in planning, intra-procedural guidance/technical evaluation, and/or post-procedure assessment.
1) Angioplasty
2) Atherectomy
3) Coil embolization
4) Dialysis fistula/graft
5) Embolectomy
6) Endarterectomy
7) Endovascular aortic aneurysm repair (EVAR)
8) Endovenous ablation
9) Inferior vena cava filter
10) Patch angioplasty
11) Stents
12) Synthetic grafts
13) Thrombolysis and thrombectomy
14) Trans-jugular intrahepatic porto-systemic shunt
15) Vein bypass grafts

i. Evaluate scanning protocol and modification(s) based on patient-specific factors.

1) History, including indication, prior vascular procedures
2) Physical examination and assessment of patient-specific factors
3) Contraindications
4) Related imaging, laboratory, and functional testing procedures
5) Clinical differential diagnosis
6) Role of ultrasound in patient management
7) Pharmacology

j. Demonstrate knowledge and application of quality assurance and statistical tests used in a vascular laboratory.

1) Correlations of clinical findings and other imaging examinations
2) Accuracy
3) Sensitivity
4) Specificity
5) Positive predictive value
6) Negative predictive value
7) Quality improvement program components, including test appropriateness, evaluation of the technical quality and compliance with protocols

k. Demonstrate proficiency in the technique of:

1) Intracranial cerebrovascular
2) Upper extremity and digital arterial physiologic testing
3) Upper extremity arterial duplex
4) Palmar arch
5) Lower extremity and digital arterial physiologic testing
6) Lower extremity exercise testing
7) Vessel mapping
8) Visceral vascular

The above proficiencies may be demonstrated in a clinical setting or in a simulated environment.

l. Demonstrate achievement of clinical competency through the performance of sonographic examinations of the vascular system according to practice parameters established by national professional organizations and the protocol of the clinical affiliates. Clinical competencies must include evaluation and documentation of:

1) Identification of anatomical and relational structures
2) Differentiation of normal from pathological/disease process
3) Image optimization in grayscale, color Doppler and spectral Doppler
4) Measurement techniques
5) Vascular competencies
    a) Extracranial cerebrovascular including vertebral vessels
    b) Aortoiliac duplex
    c) Ankle and brachial pressures/ABI
    d) Lower extremity arterial duplex
    e) Lower extremity venous duplex
    f) Lower extremity venous insufficiency testing
    g) Upper extremity venous duplex

The above may be completed as individual clinical competencies or may be incorporated with other structures/techniques as part of a limited or complete examination.

Appendix C

Administrative Letter of Support for Cardiac Sonography Faculty

THE OHIO STATE UNIVERSITY

Radiologic Sciences & Therapy Division
School of Health & Rehabilitation Sciences
The Ohio State University
453 West Tenth Avenue
431 Atwell Hall
Columbus, Ohio 43210-1234

Dear HRS Curriculum Committee members -

I am writing to express my enthusiastic support for The Ohio State University's proposed Cardiac Sonography track. This innovative program builds on the tremendous success of the existing Sonography tracks, which have consistently demonstrated a commitment to educational excellence, clinical proficiency, and comprehensive student development. The addition of a Cardiac Sonography track responds to a pressing need within the healthcare system by producing highly skilled cardiac sonographers ready to meet the demands of a rapidly growing clinical workforce.

The healthcare landscape is evolving at an unprecedented rate, and the demand for specialized expertise in cardiovascular imaging is greater than ever. The Cardiac Sonography track will uniquely position students to thrive in this emerging space by offering them targeted, specialized training in cardiovascular sonography. This training equips graduates with the advanced clinical skills and knowledge they need to make meaningful contributions to patient care, addressing complex cardiac conditions that require precise diagnostic imaging.

The program's design also provides students with increased opportunities for interdisciplinary learning, allowing them to engage in hands-on, practical experiences and collaborate with other healthcare professionals. This exposure not only enhances their technical competencies but also builds essential communication and teamwork skills, which are crucial in today's healthcare environment. Furthermore, the program's alignment with workforce needs ensures that students are career-ready upon graduation, which is increasingly important in today's competitive job market.

In conclusion, I am confident that The Ohio State University's Cardiac Sonography track will be a vital addition to the existing Sonography program. It will offer students a pathway to develop expertise in a high-demand field, positioning them at the forefront of patient-centered cardiac care. I look forward to seeing the positive impact this track will have on the students, the university, and the broader healthcare community. We remain fully committed to the development of the program and the 1.5 FTE faculty positions that will be necessary to fully develop and implement this track.

Thank you for considering this letter of support for a program that has the potential to make a substantial contribution to the future of healthcare.

Sincerely,

Georgianna Sergakis, PhD, RRT, RCP, AE-C, FAARC, FNAP
Division Director – Radiologic Sciences and Therapy and Respiratory Therapy

Appendix D

Program Guides

Appendix B: Program Guides

Radiologic Sciences & Therapy

Sonography (GEN)

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

PROGRAM OVERVIEW

Diagnostic medical sonographers and vascular technologists are skilled professionals who operate specialized equipment to conduct tests and create high-quality sonographic images of internal structures of the human body. Physicians review the findings of these examinations to form a medical diagnosis. Sonographers can also be involved during procedures where views of internal structures are acquired in real-time to aid physicians. Upon graduation from the Diagnostic Medical Sonography/Vascular Technology programs, students can sit for the American Registry for Diagnostic Medical Sonographers credentialing exams in the Abdomen, OB/GYN, and Vascular Technology specialties.

APPLICATION REQUIREMENTS

GPA of 2.50 or higher
A minimum 2.50 cumulative GPA is required in all coursework taken at any accredited institution.

Prerequisite Courses
All prerequisite courses or their equivalents must be completed with a **C- or higher by the end of the spring semester.**

Online Application
The application is available online and must be completed and submitted with all required supplemental documents, if applicable. Application FAQ can be found here.

Observation Hours
Please review the full observation hour requirement here.

A personal interview will be offered to competitive applicants. Knowledge of the profession and personal career goals will be evaluated then. The program will give individual consideration in the admission assessment to courses taken and applicant experiences.

PREREQUISITE COURSES

These courses must be completed before beginning professional coursework. Ohio State course numbers are shown below.

Math 1148 & 1149, or 1150

Chemistry 1110 or 1210

Biology 1113

Physics 1200

Physics 1201

Anatomy 2300, 3300, or EEOB 2510

EEOB 2520, or PHYSIO 3200

Psychology 1100

English 1110

HTHRHSC 2500

HTHRHSC 5500

HTHRHSC 5370 or PUBHHMP 3610

APPLICATION DEADLINE

The Radiologic Sciences and Therapy program admits students once per year, with students beginning the program in the Autumn semester. The application deadline for Autumn 2024 is January 31, 2024. The professional program will begin on August 20, 2024.

DEGREE REQUIREMENTS

The minimum hours to graduate from The Ohio State University with a Bachelor of Science in Health and Rehabilitation Sciences is 120 credit hours. The Sonography program requires 136 credit hours, not including HTHRHSC 1100. Students should reference their degree audit to ensure they complete all required degree components. This includes general education, program prerequisites, and professional curriculum.

Appendix B: Program Guides

Radiologic Sciences & Therapy

Sonography (GEN)

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

YEAR 1

Autumn	Credits
HTHRHSC 1100	1
MATH 1150	5
Chemistry 1110 or 1210	5
PSYCH 1100	3
GENED 1201	1
Total	**15**

Spring	Credits
English 1110.01	3
Biology 1113	4
Anatomy 2300, 3300, or EEOB 2510	4
HTHRHSC 2500	3
GE Foundation	3
Total	**17**

Notes

HTHRHSC 5610 is a highly recommended Radiologic Sciences and Therapy Program elective.

YEAR 2

Autumn	Credits
PHYSICS 1200	5
EEOB 2520, or PHYSIO 3101 or 3200	3
GE Theme*	4
GE Foundation	3
Total	**15**

Spring	Credits
PHYSICS 1201	5
HTHRSHC 5500	4
HTHRHSC 5370	3
GE Theme*	4
Total	**16**

Notes

An accredited CPR Course is required before beginning the professional program.

Begin Professional Coursework

YEAR 3

Autumn	Credits
RadSci 3430 Sonography 1	3
RadSci 3486 DMS Physics 1	3
RadSci 3310 Intro to Radiation	3
RadSci 3489 DMS Practicum 1	4
HTHRHSC 4200	3
Total	**16**

Spring	Credits
RadSci 3431 Sonography 2	3
RadSci 3672 Sectional Anatomy	3
RadSci 3487 DMS Physics 2	3
RadSci 3589 DMS Practicum 2	7
Total	**16**

Summer	Credits
RadSci 4530 Quality Mgmt.	3
RadSci 4488 DMS Physics 3	2
RadSci 4432 Sonography 3	2
RadSci 3689 DMS Practicum 3	7
Total	**14**

YEAR 4

Autumn	Credits
RadSci 4520 Vascular 1	3
RadSci 4325 Admin/Management	2
RadSci 4689 Vascular Practicum 1	7
GE Foundation	3
Total	**15**

Spring	Credits
RadSci 4521 Vascular 2	3
RadSci 4789 Vascular Practicum 2	7
RadSci 4630 Transition to Clinical	2
HTHRHSC 4100	1
Total	**13**

*Students must take 4-6 credits depending on the course's credit hours.

The above plan demonstrates how students may complete the Sonography program in nine semesters, including one summer term. It is assumed that students following this plan who are admitted to the program will begin professional coursework in the autumn semester of year three. There is flexibility in when a student may take courses in years one and two. However, in years three and four, the curriculum is more structured with limited ability to change. Students may choose to take non-professional courses over summer terms.

It is highly recommended that students take all GE courses before starting the professional program. The professional curriculum is completed in sequence, and there is no provision for part-time or evening-only enrollment. Students who intend to transfer credit to Ohio State may view how credit is accepted on Transferology.com.

Ohio State academic programs are designed to prepare students to sit for applicable licensure or certification in Ohio. If you plan to pursue licensure or certification in a state other than Ohio, please review state educational requirements for licensure and certification and state licensing board contact information here for online programs and here for on-campus programs.

Appendix B: Program Guides

Radiologic Sciences & Therapy

Sonography (GEN)

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

Questions? Contact the School of Health and Rehabilitation Sciences at 614-292-1706 or HRSstudentservices@osumc.edu

Updated May 2023

Appendix B: Program Guides

Radiologic Sciences & Therapy

Sonography- Echocardiography Track

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

PROGRAM OVERVIEW

Diagnostic medical sonographers and vascular technologists are skilled professionals who operate specialized equipment to conduct tests and create high quality sonographic images of internal structures of the human body. Physicians review the findings of these examinations to form a medical diagnosis. Sonographers can also be involved during procedures where views of internal structures are acquired in real time to aid physicians. Upon graduation from the Diagnostic Medical Sonography/Vascular Technology programs, students are eligible to sit for the American Registry for Diagnostic Medical Sonographers credentialing exams in the Abdomen, OB/GYN, and Vascular Technology specialties.

APPLICATION REQUIREMENTS

GPA of 2.50 or higher
A minimum 2.50 cumulative GPA is required in all coursework taken at any accredited institutions. Although a 2.5 GPA is the minimum, the average GPA of admitted students is higher.

Prerequisite Courses
All prerequisite courses or their equivalents must be completed with a **C- or higher by the end of spring semester.**

Online Application
The application is available online, which must be completed and submitted with all required supplemental documents if applicable. Application FAQ can be found here.

Observation Hours
Please review the full observation hour requirement here.

*A personal interview will be offered to competitive applicants. **Knowledge of the profession** and personal career goals will be evaluated at that time. The program will give individual consideration in the admission assessment to courses taken and applicant experiences.*

PREREQUISITE COURSES

These courses must be completed prior to beginning professional coursework. Ohio State course numbers shown below.

Math 1148 & 1149, or 1150

Chemistry 1110 or 1210

Biology 1113

Physics 1200

Physics 1201

Anatomy 2300, 3300, or EEOB 2510

EEOB 2520, or PHYSIO 3101 or 3200

Psychology 1100

English 1110

Second Writing Course

HTHRHSC 2500

HTHRHSC 5500

HTHRHSC 5370 or PUBHHMP 3610

APPLICATION DEADLINE

The Radiologic Sciences and Therapy program admits students once per year, with students beginning the program in the Autumn semester. The application deadline for Autumn 2025 is January 31, 2025. The professional program will begin August 22, 2025.

DEGREE REQUIREMENTS

The minimum total hours to graduate from The Ohio State University with a Bachelor of Science in Health and Rehabilitation Sciences is 120 credit hours. The Sonography program requires XXX credit hours, not including HTHRHSC 1100. **Thirty credit hours must be completed at The Ohio State University** to establish residency for graduation. Students should reference their degree audit to ensure they are completing all required components of the degree. This includes general education, program prerequisites, and professional curriculum.

Appendix B: Program Guides

Radiologic Sciences & Therapy

Sonography- Echocardiography Track

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

YEAR 1

Autumn	Credits
HTHRHSC 1100	1
MATH 1150	5
Chemistry 1110 or 1210	5
PSYCH 1100	3
GENED 1201	1
Total	**15**

Spring	Credits
English 1110.01	3
Biology 1113	4
Anatomy 2300, 3300, or EEOB 2510	4
HTHRHSC 2500	3
GE Foundation	3
Total	**17**

Notes

HTHRHSC 5610 is a highly recommended elective for the Radiologic Sciences and Therapy Program.

YEAR 2

Autumn	Credits
PHYSICS 1200	5
EEOB 2520, or PHYSIO 3101 or 3200	3
GE Theme	4
GE Foundation	3
Total	**15**

Spring	Credits
PHYSICS 1201	5
HTHRSHC 5500	4
HTHRHSC 5370	3
GE Theme	4
Total	**16**

Notes

An accredited CPR Course is required prior to beginning the professional program.

Begin Professional Coursework

YEAR 3

Autumn	Credits
RadSci 3510 Fund of Heart Anat Echo	4
RadSci 3486 DMS Physics 1	3
RadSci 3310 Intro to Radiation	2
HTHRHSC 4200	3
Total	**12**

Spring	Credits
HTHRHSC 5100 Pharmacology	2
RadSci 3672 Sectional Anatomy	3
RadSci 3487 DMS Physics 2	3
RadSci 3511 Card Disease Assmt of US	5
Total	**13**

Summer	Credits
RadSci 4530 Quality Mgmt	3
GE Foundation	3
RadSci 3512 Card Disease Assmt US II	3
RadSci 3789 Card Sono Prac I	8
Total	**17**

YEAR 4

Autumn	Credits
RadSci 4510 Adv Proc & Tech Echo	3
RadSci 4325 Admin/Management	2
RadSci 4889 Card Sono Prac II	7
RadSci 4511 Card Abnorm & Intervention	3
Total	**15**

Spring	Credits
RadSci 4989 Card Sono Prac III	9
RadSci 4630 Transition to Clinical	2
HTHRHSC 4100	1
Total	**12**

The above plan demonstrates how students may complete the Sonography program in nine semesters including one summer term. It is assumed that students following this plan who are admitted to the program will begin professional coursework autumn semester of year three. There is flexibility in when a student may take courses in years one and two. However, in years three and four, the curriculum is more structured with only limited ability to change. Students may choose to take non-professional courses over summer terms.

It is **highly recommended** that students take all GE courses before the start of the professional program. The professional curriculum is completed in sequence and there is **no provision for part-time or evening-only enrollment.** Students who intend to transfer credit to Ohio State may view how credit is accepted on Transferology.com.

Appendix B: Program Guides

Radiologic Sciences & Therapy

Sonography- Echocardiography Track

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

Ohio State academic programs are designed to prepare students to sit for applicable licensure or certification in Ohio. If you plan to pursue licensure or certification in a state other than Ohio, please review state educational requirements for licensure and certification and state licensing board contact information here for online programs and here for on-campus programs.

Questions? Contact the School of Health and Rehabilitation Sciences at 614-292-1706 or HRSstudentservices@osumc.edu

Updated June 2024

Appendix E

Cardiac Sonography New Course Syllabi

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 3510

Fundamentals of Echocardiography and Cardiac Anatomy

Autumn 2025

5 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Fundamental understanding of heart anatomy, embryology, physiology, pathophysiology, and echocardiographic appearances to accurately assess and perform echocardiograms for quality patient care.

PREREQUISITES

Admission into the Radiologic Sciences & Therapy Division Sonography Program. Fundamentals of Echocardiography and Cardiac Anatomy is a course designed for Junior Radiologic Sciences and Therapy students.

COURSE LEARNING OUTCOMES

This course will provide an exciting opportunity for the student to become better acquainted with the scope and practice of cardiac sonography. This course was designed based on the content outline and guidelines provided by the American Registry of Diagnostic Medical Sonographers (ARDMS) in Adult Echocardiography and the Joint Review Commission on Education in Diagnostic Medical Sonography (JRC-DMS).

Upon completion of Fundamentals of Echocardiography and Cardiac Anatomy, the student will be able to:

1. Demonstrate comprehensive knowledge of heart anatomy, embryology, physiology, pathophysiology, and echocardiographic appearances to accurately assess and perform echocardiograms for quality patient care.

2. Sequence the formation of the heart from the primitive heart tube to the development of the six aortic arches, describe cardiac septation including atrial and ventricular development, describe the formation of the atrioventricular valves and the semilunar valves, and compare fetal and neonatal circulation.

3. Identify common M-mode patterns associated with cardiac disease, apply pertinent Doppler formulas to the cardiac setting, and differentiate between all normal anatomy visualized on an echocardiogram.

4. Describe factors affecting hemodynamic status, know normal hemodynamic parameters, and analyze the relationship between phases of the cardiac cycle and electrocardiographic events to understand spectral Doppler physiology in valvular and pulmonary vein flow.

5. Classify different types of wall motion abnormalities and describe 2-D, M-mode, and Doppler features associated with ischemic heart disease to assess ventricular function.

COURSE POLICIES

All School and Program course policies apply to this course. HRS Handbooks are available. These provide all required policies and procedures required for students accepted into SHRS academic programs.

Students may use Red Button to report academic and learning environment concerns to the School of Health and Rehabilitation Sciences Assistant Dean for Academic Affairs and the Assistant Dean for Diversity and Inclusion. You may choose to remain anonymous but if you provide your contact details, individualized, who will respond quickly and efficiently to all reports. Note that specific follow-up can only be provided. When you complete if a student chooses to report with the Red Button System, the Directors for Academic Affairs and Diversity & Inclusion receive the report and will review within 72 hours. their name; anonymous reports will be reviewed but students will not be contacted.

COURSE TECHNOLOGY

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. IT support hours are available online, and support for urgent issues is available 24 hours a day, seven days per week.

Self-Service and Chat support: go.osu.edu/IT • Phone: 614-688-HELP (4357)

Email: ServiceDesk@osu.edu • TDD: 614-688-8743

Internet requirements:

Minimum WiFi speed of 3 MB/s is required for using CarmenCanvas to submit assignments, while a minimum 7 MB/s is recommended for Zoom classes, streaming lectures, etc. Students can connect devices to campus wireless internet, eduroam, by navigating to wireless.osu.edu.

Microsoft 365

This course requires students to author documents using Microsoft 365. Students can login to Microsoft 365 via microsoft365.osu.edu. Check the university's IT Service Desk knowledge base article KB04728, FAQ on Office 365 for Students, for information on hardware requirements.

Honorlock

This course uses Honorlock to remotely proctor one or more quizzes and exams. Check Honorlock's minimum system requirements online for hardware, microphone, webcam, and internet upload speed requirements.

Students may request an in-person proctoring alternative to Honorlock or other online proctoring tools. The student is expected to contact the instructor as soon as possible to coordinate the accommodation. Students will not be permitted to take remotely proctored exams in their homes or residence halls unless they are willing to conduct a room scan. By choosing to take the exam in their home or residence hall, the student is consenting to the room scan of the area in which they take the exam.

UNIVERSITY POLICIES

Up to date university policies are available from the Office of Undergraduate Education, and these policies apply to this course. You can view the following statements and policies:

- Academic Misconduct
- Artificial Intelligence and Academic Integrity
- Copyright
- Counseling and Consultation Services/Mental health statement
- Creating an environment free from harassment, discrimination, and sexual misconduct
- Disability Statement (with accommodations for COVID)
- Diversity Statement
- Grievances and solving problems.
- Lyft Ride Smart
- Weather / Short-term closing

RELIGIOUS ACCOMMODATIONS

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement **and** the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

YOUR MENTAL HEALTH-COUNSELING AND CONSULTATION SERVICES

The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you are a student in the School of Health and Rehabilitation Sciences, you may schedule an appointment with our mental health counselors: simply email hrscom.counseling@osumc.edu, indicate which program you are enrolled in and that you are interested in scheduling an initial counseling appointment. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand.

You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 988 or at 988lifeline.org. The Ohio State Wellness app is also a great resource.

SCHOOL SPECIFIC GRIEVANCE AND SOLVING PROBLEMS

Please see HRS Student Handbook Policy #20 – Student Appeal Process. In general, a student should meet with the instructor of record for the course first and then, as outlined in Policy #20, a student should then take any problem or grievance to the Division Director.

CONDUCT IN THE CLASSROOM AND ACADEMIC LEARNING ENVIRONMENT

Students will adhere to the code of student conduct for The Ohio State University at all times. Students in the School of HRS have additional professional requirements for behavior due to the nature of their professional training and the environments in which learning may occur. Please see HRS Student Handbook Policy # 5.

GRADING AND EVALUATION

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

Course grade will be based on:

Assignment Name	Points / Weight
Participation	10%
Lab Competencies	20%
Carmen Quizzes	10%
Exams (4)	40%
Final Exam	20%
Total	**100%**

COURSE ASSIGNMENTS

Descriptions for assignment or category of assignments, including expectations about individual vs. collaborative work, relative weight toward the course grade, and information about the length and format of all papers.

Handbook Resource

Carmen Quizzes

Exams

Final Exam

GRADING SCALE

A	A-	B+	B	B-	C+	C	C-	D+	D	E
93-100%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	61-66%	0-60%

ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

ABSENCE/MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

LATE ASSIGNMENT SUBMISSIONS

Late submissions will not be accepted. Please refer to Carmen for due dates.

COURSE SCHEDULE

Week #	Dates	Topic	Readings	Assignments Due
1		Course Introduction		
2		Anatomy of the Heart		
3		Anatomy of the Heart		

Week #	Dates	Topic	Readings	Assignments Due
4		Anatomy of the Heart		
5		Fetal and Neonatal Heart		
6		Fetal and Neonatal Heart		
7		Foundations: Hemodynamics		
8		Foundations: Cardiac Disease		
9		Foundations: Cardiac Disease		
10		Foundations: Cardiac Disease		
11		Wall Motion Abnormalities		
12		Wall Motion Abnormalities		
13		TBD		
14		Review		
Finals		Insert Final Exam Day and Time		

Specific Learning Objectives include:

1. Ability to recognize and document normal cardiac anatomy (including pericardium, myocardium, and endocardium), vessels (aorta and vena cava), and surrounding structures.

2. Ability to recognize and document anatomic variants related to the heart.

3. Knowledge of normal hemodynamic response to stress testing and maneuvers.

4. Knowledge of normal systolic and diastolic function, along with normal valve function and measurements.

5. Knowledge of normal arterial and venous return.

6. Describe the phases of the cardiac cycle and the location and function of each portion of the cardiac conduction system.

7. List the events that lead to myocardial contraction.

8. Ability to explain how body habitus influences the position of the heart in the thoracic cavity.

9. Describe the embryology sequence of the heart beginning with the primitive heart tube through the development of the six aortic arches.

10. Ability to recognize and document normal cardiac septation including atrial and ventricular.

11. Describe the formation of the atrioventricular valves and the semilunar valves.

12. Ability to compare the differences in fetal and in neonatal circulation.

13. Describe a 2-D echocardiographic examination using proper nomenclature.

14. Identify common M-mode patterns associated with cardiac disease.

15. Associate the best Doppler approach based on location of various cardiac diseases.

16. Explain provocative, positional, and breathing maneuvers that affect venous inflow and cardiac output.

17. Explain the appearance of echocardiographic artifacts on an image.

18. Describe myocardial segmentation.

19. List normal pressures of cardiac chambers and great vessels.

20. Relate phases of the cardiac cycle to electrocardiographic events.

21. Describe spectral Doppler physiology as it relates to valvular and pulmonary vein flow.

22. Identify the etiologies, signs and symptoms, and risk factors of ischemic heart disease.

23. Classify the types of wall motion abnormalities.

24. Describe 2-D, M-mode and Doppler features associated with ischemic heart disease.

25. Differentiate ways to assess global LV function and regional LV quantification.

COPYRIGHT

THIS SYLLABUS, THE COURSE ELEMENTS, POLICIES, AND SCHEDULE ARE SUBJECT TO CHANGE.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 3511

Cardiac Disease with Assessment of Ultrasound I

Spring 2026

5 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Overview of the pathophysiology, clinical presentation, and treatment options for a range of heart diseases including coronary artery, valvular, hypertensive, pericardial, and cardiomyopathy.

PREREQUISITES

Designed for Junior Radiologic Sciences and Therapy students. Admission into the Radiologic Sciences & Therapy Division Sonography Program and successful completion of Fundamentals of the Heart Anatomy and Echocardiography.

COURSE LEARNING OUTCOMES

This course was designed based upon the content outline and guidelines provided by the American Registry of Diagnostic Medical Sonographers (ARDMS) in Adult Echocardiography and the Joint Review Commission on Education in Diagnostic Medical Sonography (JRC-DMS).

Upon completion of Cardiac Disease with Assessment of Ultrasound I, the student will be able to:

1. Identify and explain the relationship between ventricular wall segments and coronary artery distribution, as well as differentiate between complications associated with myocardial infarction.

2. Discuss the key echocardiographic findings associated with valvular heart disease, understand valvular heart disease and prosthetic valves through comprehensive study and analysis of the anatomy, pathophysiology, and management of these conditions.
3. Analyze and compare the echocardiographic characteristics of hypertrophic cardiomyopathy (HCM), dilated cardiomyopathy (DCM), restrictive cardiomyopathy (RCM), and arrhythmogenic RV dysplasia to differentiate between the different types of cardiomyopathies and understand the primary and secondary etiologies in DCM, while also identifying common infiltrative systemic myocardial diseases.
4. Explain the pathophysiology of systemic and pulmonary hypertensive diseases, list classifications of pulmonary hypertension, describe the echocardiographic features associated with these diseases, and define Eisenmenger's Syndrome.
5. Identify key etiologies of pericardial disease, explain the pathophysiology and hemodynamics of cardiac tamponade and constrictive pericarditis, describe key echocardiographic features of cardiac tamponade and constrictive pericarditis, explain Doppler criteria associated with cardiac tamponade and constrictive pericarditis, and describe key echocardiographic features of congenital absence of the pericardium.

COURSE POLICIES

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- Artificial Intelligence and Academic Integrity
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RELIGIOUS ACCOMMODATIONS

- Weather / Short-term closing

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: Please see HRS Student Handbook Policy #20 – Student Appeal Process. In genera[illegible] the instructor of record for the course first and then, as outlined in Policy #20, a stude[illegible] problem or grievance to the Division Director.

Rusnak, Sarah
2024-07-19 15:14:00

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Rusnak, Sarah
2024-07-19 15:15:00

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GRADING AND EVALUATION

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

ASSIGNMENT TYPE

- **Independent Work:** Strictly non-collaborative, original-individual work. You m[illegible] only with your instructor. Discussions with other individuals, either in person o[illegible] prohibited.

Rusnak, Sarah
2024-07-19 15:16:00

This section may be removed; it is optional.

- **Collaboration Required:** An explicit expectation for collaboration among students either in-class or outside (i.e. group work).
- **Optional-Collaboration:** Students are permitted, but not required, to discuss the assignment or ideas with each other. However, all submitted work must be one's original and individual creation.

Course grade will be based on:

Assignment Name	Points / Weight
Participation	10%
Lab Competencies	20%
Carmen Quizzes	10%
Exams (4)	40%
Final Exam	20%
TOTAL COURSE POINTS**Total**	**100%**

COURSE ASSIGNMENTS

Descriptions for assignment or category of assignments, including expectations about individual vs. collaborative work, relative weight toward the course grade, and information about the length and format of all papers.

Handbook Resource

Carmen Quizzes

Exams

Final Exam

GRADING SCALE

A	A-	B+	B	B-	C+	C	C-	D+	D	E
93-100%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	61-66%	0-60%

ATTENDANCE / ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, I will notify you as to which alternative methods of teaching will be offered to ensure continuity of instruction for this class. Communication will be via [CarmenCanvas, email or other mode of communication].

LATE ASSIGNMENT SUBMISSIONS

Late submissions will not be accepted. Please refer to Carmen for due dates.

ABSENCE AND MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

COURSE SCHEDULE

Week #	Dates	Topic	Readings	Assignments Due
1		Foundational Anatomic Relationships		
2		Foundational Anatomic Relationships		
3		Valvular Disease		
4		Valvular Disease		
5		Valvular Disease		
6		Cardiomyopathies		
7		Cardiomyopathies		
8		Systemic and Pulmonary Hypertensive Diseases		
9		Systemic and Pulmonary Hypertensive Diseases		
10		Pericardial Diseases		
11		Pericardial Diseases		
12		Pericardial Diseases		

Week #	Dates	Topic	Readings	Assignments Due
13		TBD		
14		Review		
Finals		Insert Final Exam Day and Time		

Learning Objectives:

1. Ability to correlate ventricular wall segments to coronary artery distribution.
2. Differentiate complications associated with myocardial infarction.
3. Discuss signs, symptoms, and common etiologies associated with valvular heart disease.
4. List the parameters used in qualitative and quantitative assessment of valvular heart disease.
5. Describe key echocardiographic findings associated with valvular heart disease.
6. Explain the methods for estimation of right atrial and right ventricular systolic pressure.
7. Describe typical echocardiography views utilized in assessing valvular stenosis and regurgitation.
8. Discuss the challenges of stenotic valve assessment in the presence of reduced LV function or significant regurgitation.
9. Describe common locations of vegetation formation.
10. Identify the signs and symptoms of infective endocarditis.
11. List examples of mechanical and bioprosthetic valves.
12. Differentiate between advantages of using mechanical versus bioprosthetic valves.
13. Describe Doppler calculations used to assess prosthetic valves and the common complications of prosthetic valves.
14. Discuss the echocardiographic features associated with hypertrophic cardiomyopathy (HCM), dilated cardiomyopathy (DCM), restrictive cardiomyopathy (RCM) and arrhythmogenic RV dysplasia.
15. Differentiate between the echocardiographic features of cardiomyopathies.
16. List common infiltrative systemic myocardial diseases.
17. Explain the pathophysiology of systemic hypertensive disease and pulmonary hypertensive disease.
18. List classifications of pulmonary hypertension.
19. Describe the echocardiographic features associated with systemic and pulmonary hypertensive disease.
20. Define Eisenmenger’s Syndrome.
21. List key etiologies of pericardial disease.
22. Explain the pathophysiology and hemodynamics and key echocardiographic features of cardiac tamponade and constrictive pericarditis.
23. Explain Doppler criteria associated with cardiac tamponade and constrictive pericarditis.
24. Describe key echocardiographic features of congenital absence of the pericardium.
25. List benign and malignant cardiac tumors and describe echocardiographic criteria used for evaluating tumors.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 3512

Cardiac Disease with Assessment of Ultrasound II

Summer 2026

3 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Study of cardiac sonography as it relates to cardiac tumors, aortic disease, electrical activation, and pediatric and adult congenital heart disease.

PREREQUISITES

Designed for Junior Radiologic Sciences and Therapy students. Admission into the Radiologic Sciences & Therapy Division Sonography Program and successful completion of Fundamentals of the Heart Anatomy and Echocardiography.

COURSE LEARNING OUTCOMES

This course was designed based upon the content outline and guidelines provided by the American Registry of Diagnostic Medical Sonographers (ARDMS) in Adult Echocardiography and the Joint Review Commission on Education in Diagnostic Medical Sonography (JRC-DMS).

Upon completion of Cardiac Disease with Assessment of Ultrasound II, the student will be able to:

1. Identify and describe the characteristics of benign and malignant cardiac tumors, differentiate between cardiac tumors and cardiac structures using echocardiographic criteria, and list potential sources of artifactual echoes within the chambers.

2. Identify and differentiate between the echocardiographic features associated with Marfan syndrome, aortic aneurysm, sinus of Valsalva aneurysms, and dissection, as well as list the etiologies and classifications of aortic aneurysm and dissection.
3. Analyze and interpret normal and abnormal electrical pathways and wave forms on ECG, as well as echocardiographic findings associated with altered electrical activation, to effectively identify and recognize abnormal ECG tracings at the post-secondary level.
4. Analyze echocardiographic findings and utilize the segmental approach to identify, characterize, and tailor the echocardiography exam for each type of congenital heart disease, while listing parameters used in qualitative and quantitative assessment and describing common surgical repairs for pediatric and adult patients.

COURSE POLICIES

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RELIGIOUS ACCOMMODATIONS

- Weather / Short-term closing

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A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement **and** the student has notified their

instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

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: Please see HRS Student Handbook Policy #20 – Student Appeal Process. In general, a student should meet with the instructor of record for the course first and then, as outlined in Policy #20, a student should then take any problem or grievance to the Division Director.

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: Students will adhere to the code of student conduct for The Ohio State University at all times. Students in the School of HRS have additional professional requirements for behavior due to the nature of their professional training and the environments in which learning may occur. Please see HRS Student Handbook Policy # 5.

GRADING AND EVALUATION

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

Course grade will be based on:

Assignment Name	Points / Weight
Participation	10%
Lab Competencies	20%
Carmen Quizzes	10%

Assignment Name	Points / Weight
Exams (4)	40%
Final Exam	20%
Total	**100%**

COURSE ASSIGNMENTS

Descriptions for assignment or category of assignments, including expectations about individual vs. collaborative work, relative weight toward the course grade, and information about the length and format of all papers.

Handbook Resource

Carmen Quizzes

Exams

Final Exam

GRADING SCALE

A	A-	B+	B	B-	C+	C	C-	D+	D	E
93-100%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	61-66%	0-60%

ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

ABSENCE AND MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

LATE ASSIGNMENT SUBMISSIONS

Late submissions will not be accepted. Please refer to Carmen for due dates.

COURSE SCHEDULE

Week #	Dates	Topic	Readings	Assignments Due
1		Course Introduction; Review		
2		Marfan Syndrome		
3		Considerations: Aorta		
4		Considerations: Aorta		
5		Considerations: Aorta		
6		Considerations: Electrical Pathways		
7		Considerations: Electrical Pathways		
8		Congenital Heart Disease		
9		Congenital Heart Disease		
10		Congenital Heart Disease		
11		Presentations		
12		Presentations		
13		TBD		
14		Review		
Finals		Insert Final Exam Day and Time		

Learning Objectives:

1. Describe echocardiographic features associated with Marfan syndrome.
2. List the etiologies of aortic aneurysm and dissection.
3. Describe two classifications of dissection.
4. Explain the echocardiographic features of aortic aneurysm, and sinus of Valsalva aneurysms and dissection.
5. Describe normal electrical pathways.
6. Define normal electrical wave forms seen on ECG.
7. Describe echocardiographic findings associated with altered electrical activation.
8. Recognize abnormal ECG tracing.
9. Describe echocardiographic findings associated with various types of congenital heart disease.
10. Discuss clinical signs and symptoms associated with congenital heart disease.
11. Explain how the segmental approach is utilized to identify and characterize congenital heart disease.
12. Describe common surgical repairs seen in pediatric and adult patients with congenital heart disease.
13. Ability to perform a comprehensive evaluation of cardiac pathologies.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 3789

Cardiac Sonography Practicum I

Summer 2026

8 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Cardiac Sonography students develop the skill and art of creating cardiac sonography images through patient interaction and creating performing sonographic studies.

PREREQUISITES

Admission into the Radiologic Sciences & Therapy Division Sonography Program.

COURSE LEARNING OUTCOMES

Upon completion of Cardiac Sonography Practicum I, the student will be able to address these topics:

1. Students will demonstrate professional conduct in sonography practice by prioritizing patient privacy, security, and comfort while effectively coordinating clinical information to ensure patient safety and quality health care.
2. Students will demonstrate the ability to accurately identify cardiac anatomy and limited pathology from sonographic patient cases, apply patient history information to exams, ensure proper patient preparations, and position patients effectively for exams.

3. Students will demonstrate proficiency in verbal and written communication using appropriate sonography terminology, recognize critical echocardiographic findings, apply proper ergonomic techniques, and position patients effectively for optimal results in sonography exams.
4. Students should demonstrate the ability to accurately measure blood pressure, interpret readings, understand contraindications for echocardiographic procedures, identify types of medical emergencies in the lab, and effectively manage these emergencies, as well as utilize various measurement techniques for the heart's chambers, vessels, and valves.
5. Students will demonstrate proficiency in interpreting EKG findings, placing EKG leads correctly, managing intravenous lines, measuring pressure half-time, planimetry, arterial pressure, diameter, and shunt ratios, as well as understanding the types and applications of saline and echo-enhancing contrast agents, including recognizing contraindications.
6. Students will demonstrate proficiency in obtaining standard echocardiographic views, modifying views as needed, utilizing non-imaging transducers, understanding ultrasound console settings and their functions, recognizing artifacts and adjusting scanning techniques accordingly, and optimizing imaging, including Doppler, to enhance diagnostic accuracy.

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Rusnak, Sarah
2024-07-19 15:15:00

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GRADING AND EVALUATION

Each participant is required to spend approximately 32 hours per week in a sonography clinic and actively participate in all facets of the service. Upon completion of this course, each student should submit:

1. **Evaluations** completed in the E*Value system; including, but not limited to:
    a. Clinical site orientation and student goals (rotation week 1)
    b. Student self-assessment (within 3 days of the last day of that rotation)

STUDENT EVALUATION OF SITE (WITHIN 3 DAYS OF THE LAST DAY OF THAT ROTATION)

i. Assigning affective evaluations to clinical instructor(s). An affective evaluation must be assigned by the student to *at least one clinical instructor both at the mid-point and end of*

each clinical rotation. These must be assigned within **3 days** of the automated reminder date from E-value.

2. **Instructorship Hours (CME) form(s)** completed in the E-Value system
    a. CME distribution must be assigned by the student to all sonographers who they have worked with during each rotation. It is the student's responsibility to record and keep track of how many hours they have spent (up to 6) with each clinical instructor and identify on the CME coursework form in E-value at the end of the rotation.
    b. CMEs must be assigned **within three (3) days after the last day of that rotation.**

3. **Clinical Proficiency (or clinical competency)** evaluations completed in the E*Value system.

    A clinical instructor in a designated clinical affiliate or a faculty member in the Laboratory for Investigative Imaging will complete. This will serve as a formative evaluation for each student. See Clinical Proficiency Requirements below for competency requirements.

4. **Clinical log** is to be kept with exam information and/or sample images for instructor evaluation. Students must keep a thorough record of all exams in which they are involved throughout each clinical day. This includes exams in which they observe, assist, post-scan, or perform with limited supervision. The student must also submit a completed **procedure template** to the program director and/or clinical coordinator at the end of the semester.

Attendance and time tracking verified by the clinical instructor via E*Value system

5. **Active participation**; including, but not limited to: time tracking of hours spent in the lab, engagement with instructors and other students, files and worksheets uploaded to Carmen.

Final Grades will be based on the following percentages:

Clinical Evaluations		**50%**
Clinical Goals	5%	
Self-assessment	5%	
Evaluation of site	5%	
Affective CI Evaluation	5%	
Instructorship Hours (CME)	5%	
Proficiencies (Comps)	25%	
Attendance/ participation		**50%**

Clinical Log	25%
Time Tracking & Attendance	25%
Total	**100%**

Failure to complete any items included in the course assessment will subject the student to a reduction of points from their grade as outlined below, and an official warning with future occurrence leading to a professional probation and disenrollment.

GRADING SCALE

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

ASSIGNMENT TYPE

- **Independent Work:** Strictly non-collaborative, original-individual work. You m… is assignment only with your instructor. Discussions with other individuals, either in person o… e strictly prohibited.
- **Collaboration Required:** An explicit expectation for collaboration among stud… sites and in class or outside (i.e. group work).
- **Optional-Collaboration:** Students are permitted, but not required, to discuss the assignment or ideas with each other. However, all submitted work must be one's original and individual creation.

Rusnak, Sarah
2024-07-19 15:16:00

This section may be removed; it is optional.

Assignment NameA	Points / WeightA-	Assignment TypeB+	B	B-	C+	C	C-	D+	D	E
100 - 93%	92.9-90%	89.9-87%	86.9-83%	82.9-80%	79.9-77%	76.9-73%	72.9-70%	69.9-67%	66.9-60%	60% and below

Please Note: Possible Grade Deductions

- **Punctuality** at clinical is mandatory. ***Clocking in more than 5 minutes past your scheduled shift due to reporting late to your clinical site is considered tardy for the day.***
  - 3 tardies will result in a full letter grade reduction and recommendation for professional probation.
  - 5 or more tardies will result in an "E" for the course, and recommendation for professional probation
- If the student forgets to clock in or out 4 or more times, this will result in a full letter grade reduction. 5 or more of these occurrences will result in an "E" for the course, and recommendation for professional probation

- Students are permitted **10.5 hours of free time** from their scheduled clinical hours for the semester. Scheduled absences, choosing to leave early, doctor's appointments, and illness are all included in these hours.
    - Each hour missed outside of the student's free hours, or documented illness/emergency will result in a 4-point reduction from the attendance portion of their grade
- Failure to include E-value comments for reasons outlined in student responsibilities above will result in a one-point reduction from the attendance portion of their grade for each of these occurrences.
- ALL clinical competencies, affective evaluations, timekeeping materials, scheduled and make-up hours, Instructorship CMEs must be completed by the last day of finals for the semester.
    - Evaluations and competencies not assigned by this date will not be counted toward the student's final grade.
- Furthermore, if a clinical instructor from the university visits your site during a scheduled clinical time and you are not present, it will result in a full letter grade deduction. NO EXCEPTIONS. It is the student's responsibility to inform the Clinical Coordinator of any absence from clinical, including leaving clinical early.

CLINICAL PROFICIENCY REQUIREMENTS

Students will be required to obtain the following clinical proficiencies in the areas of **Cardiac sonography** throughout the semester. Proficiencies will be awarded by the clinical site instructor and confirmed by the clinical coordinator.

The below table demonstrates the different levels of competencies within the E*Value online system and the expected minimum proficiencies to be earned this semester in each category. Categories are based on scanning skill and the amount a student performs for the selected exam. The percentage that is recorded should be based on a collaborative agreement between student and instructor. However, the designated CI for each exam will ultimately report the percentage of the exam and decide if the student passes the exam. Furthermore, competencies should commensurate with those exams being recorded in the clinical log. Failure to obtain a diverse set of comps reflecting the student's clinical log may result in point reduction. Please check with the clinical coordinator if you have any concerns or questions.

	Student Role (percentage)			
Proficiency	25%	50%	75%	100%
	5	2	0	0

ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

ABSENCE AND MAKEUP POLICY

See student responsibilities below

LATE ASSIGNMENT SUBMISSIONS

No late assignments will be accepted.

COURSE SCHEDULE

Students must pass these comps in order to receive credit. Failure to obtain all of the required clinical proficiencies will result in a 10% grade deduction for each one missing. Furthermore, missed proficiencies are expected to be made up the next clinical semester.

LIST OF CLINICAL PROFICIENCIES

The proficiencies below are provided in the E*Value online system within the PXDX tile. Students may choose from the following exams, including elective proficiencies. However, the main focus for this semester should be on the primary proficiencies in each concentration.

ADULT CARDIAC CONCENTRATON

		Insert Final Exam Day and Time**PROFICIENCIES** • 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 systolic and diastolic ventricular function • Evaluation of the severity of valve stenosis and regurgitation • Evaluation of normal and abnormal prosthetic valves,		

		assist devices and interventional procedures • Stress echocardiography – exercise • Stress echocardiography – pharmacologic • Transthoracic enhanced echocardiogram • Complete transthoracic echocardiogram – Normal • Systolic dysfunction • Diastolic dysfunction • Aortic valve or aortic root pathology • Mitral valve pathology • Right heart pathology • Cardiomyopathy • Pericardial pathology • Prosthetic valve • Coronary artery disease • Contrast-enhanced echocardiography (observe)		

STUDENT RESPONSIBILITIES

- Each student is responsible for:
    - Wearing required PPE in clinical each day
    - Completing their assigned clinical rotation and lab sessions and documenting all required hours by adhering to the time tracking procedures outlined below. **Successful completion of clinical rotations includes the student's arrangement of transportation to and from all assigned clinical sites.**
    - Performing specified competency and affective evaluations
    - Conforming to the rules and regulations of the clinical affiliate assignment
    - Adhering to the school dress code as outlined in the Radiologic Sciences & Therapy handbook
    - Attending and participating in all scheduled laboratory activities and turning in lab assignments
- If the student is not able to meet the responsibilities for reasons beyond his/her control*, the student must meet with the Program Director about these circumstances and request, in writing, a grade of incomplete for the course.*
    - Failure to request incomplete will result in the awarding of an unsatisfactory grade (E) for the semester.
- Incomplete grades shall be awarded ONLY under circumstances which the Instructor considers legitimate, as in the case of documented illness, death in the family, jury duty, etc. (Rules of the University Faculty).
- NO incompletes will be issued for reasons other than those situations which are similar to the examples listed or deemed appropriate by the instructor.

- **<u>THE USE OF CELLULAR PHONES IN THE CLINICAL AND LABORATORY SETTING IS STRICTLY FORBIDEN.</u>**
    - Clinical Instructors and Radiologic Sciences faculty have the authority to report students who have their cell phones out during clinical rotations. The Instructor will inform the Clinical Coordinator and send the student home for the day. The hours missed will count as an unexcused absence. In addition, A FULL LETTER GRADE DEDUCTION WILL ALSO BE APPLIED TO THE STUDENTS OVERALL GRADE.
    - Students CAN have their cell phones out during their lunch break.
    - If a student has an emergency (ill family member, sick child, etc.), the student should inform the Clinical Instructor at the beginning of their clinical rotation about having their cell phone on them for a potential important phone call. This is handled on an individual basis.
- The student **must** clock in using the E*Value reporting system when arriving and leaving clinical rotations and scheduled scan labs (http://www.e-value.net).
    - Students MUST use a computer at their clinical site when clocking in and out of E-value. **CELL PHONES AND MOBILE DEVICES ARE NOT PERMITTED to be used for clocking in and out of E-value at clinical sites**, unless required by the clinical instructor at that site.
    - Students should clock in and out via cell phone using the E*Value app when arriving for scheduled scan labs. The clinical site selection should be “OSU Laboratory for Investigative Imaging” and the instructor should be the Radiologic Sciences faculty member present during the lab session.
    - If E*Value is not available that day, you must have time documented when arriving and leaving by the clinical instructor via email. **You must also notify your Clinical Coordinator in writing, via e-mail, with the date(s) that time cards were used within 24 hours of the end of that clinical shift.**
    - If you forget to clock in or out of E*Value or a computer is not available when your shift begins or ends, you **must** make sure to make a note in the “comment” section in the E*Value system explaining this occurrence.
    - If the sonography staff is leaving for the day ***more than 15 minutes*** prior to the end of the student’s 8.5 hour shift, you **must** make sure to make a note in the “comment” section in the E*value system.
- **In the event of absence** from clinical ***both the clinical assigned area and the division faculty must be notified*** prior to the scheduled clinical time by phone or professional e-mail.
    - It is the student’s responsibility to obtain contact information for the Clinical Instructors at their sites in order to notify them of absence.
    - Unless otherwise instructed, ALL occurrences of clinical absence must be reported by the student in an e-mail addressed to **<u>Jodi Eshleman and Rachel Pargeon</u>** (see contact information above)
    - ***Contacting a Clinical Instructor or faculty member on their cell phone is for <u>EMERGENCIES ONLY</u>.***
    - **<u>OUTSIDE OF THE STUDENT’S FREE HOURS, THE ONLY MISSED CLINICAL HOURS WHICH ARE PERMITTED TO BE MADE UP ARE THOSE WITH DOCUMENTED ILLNESSES OR DOCTOR’S VISITS AND FAMILY EMERGENCIES</u>. All other missed hours will be considered, on an individual basis, in calculating your course grade.**
    - Any paperwork associated with documented illnesses and doctor’s visits must be turned in to the course instructor within 24 hours of the student’s return
    - Any make-up hours must be discussed with both the clinical instructor at the site and the course instructor prior to attending make-up clinical. ALL occurrences of make-up hours must be reported by the student in an e-mail addressed to Clinical Coordinator (see contact information above)

- **ANY student not following the above procedure shall be subject to a reduction of points in the time tracking category and/or attendance category as outlined below, and an official warning with future occurrence leading to professional probation and disenrollment.**

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THIS SYLLABUS, THE COURSE ELEMENTS, POLICIES, AND SCHEDULE ARE SUBJECT TO CHANGE.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 4510

Advanced Procedures & Techniques of Echocardiography

Fall

3 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Study of stress echocardiography, transesophageal echocardiography (TEE), real time 3-D echo, enhanced cardiac echo and advanced techniques.

PREREQUISITES

Designed for Junior Radiologic Sciences and Therapy students. Admission into the Radiologic Sciences & Therapy Division Sonography Program and successful completion of Fundamentals of the Heart Anatomy and Echocardiography.

COURSE LEARNING OUTCOMES

This course was designed based upon the content outline and guidelines provided by the American Registry of Diagnostic Medical Sonographers (ARDMS) in Adult Echocardiography and the Joint Review Commission on Education in Diagnostic Medical Sonography (JRC-DMS).

Upon completion of Cardiac Disease with Assessment of Ultrasound I, the student will be able to:

1. Describe the purpose of stress echocardiography and differentiate between the indications of exercise versus pharmacologic stress echocardiography, name common pharmacological agents used, identify necessary

equipment, explain the protocol, name pre- and post-echocardiographic views, identify wall motion abnormalities, and associate major coronary arteries with the 16- and 17-segment perfusion model.

2. Accurately describe the purpose and protocol of transesophageal echocardiography, identify the necessary equipment for a TEE procedure, and list common clinical indications for performing a TEE.

3. List the clinical indications for real time 3-D imaging echocardiography, describe the equipment components necessary to perform real time 3-D imaging echocardiographic examinations, and explain the advantages and limitations of real time 3-D imaging compared to 2-D echocardiography.

4. Sequence the set-up and imaging procedure for administering contrast, list the various contrast agents used in the clinical setting, differentiate between the types of contrast, describe clinical indications and contraindications for the use of contrast, and explain appropriate equipment settings necessary to perform an optimal contrast study.

5. Demonstrate proficiency in utilizing advanced techniques and procedures in echocardiography, including in clinical settings, through a thorough understanding of the technical applications of each method.

COURSE POLICIES

All School and Program course policies apply to this course. SHRS Handbooks are available. These provide all required policies and procedures required for students accepted into SHRS academic programs.

Students may use Red Button to report academic and learning environment concerns to the School of Health and Rehabilitation Sciences Assistant Dean for Academic Affairs and the Assistant Dean for Diversity and Inclusion. You may choose to remain, who will respond quickly and efficiently to all reports. Note that specific follow-up can only be provided if a student chooses to report their name; anonymous reports will be reviewed but if you provide your contact details, individualized follow-up can be provided. When you complete a report with the Red Button System, the Directors for Academic Affairs and Diversity & Inclusion receive the report and will review within 72 hours. students will not be contacted.

COURSE TECHNOLOGY

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available IT support hours are available online, and support for urgent issues is available 24 hours a day, seven days per week.24x7.

Self-Service and Chat support: go.osu.edu/IT • Phone: 614-688-HELP (4357)

Email: ServiceDesk@osu.edu • TDD: 614-688-8743

Internet requirements:

Minimum WiFi speed of 3 MB/s is required for using CarmenCanvas to submit assignments, while a minimum 7 MB/s is recommended for Zoom classes, streaming lectures, etc. Students can connect devices to campus wireless internet, eduroam, by navigating to wireless.osu.edu.

Microsoft 365

This course requires students to author documents using Microsoft 365. Students can login to Microsoft 365 via microsoft365.osu.edu. Check the university's IT Service Desk knowledge base article KB04728, FAQ on Office 365 for Students, for information on hardware requirements.

Honorlock

This course uses Honorlock to remotely Examplify to proctor oneon or more quizzes and exams. Check Honorlock's minimum system requirements online for hardware, microphone, webcam, and internet upload speed requirements.

Students may request an in-person proctoring alternative to Honorlock or other online proctoring tools. The student is expected to contact the instructor as soon as possible to coordinate the accommodation. Students will not be permitted to take remotely proctored exams in their homes or residence halls unless they are willing to conduct a room scan. By choosing to take the exam in their home or residence hall, the student is consenting to the room scan of the area in which they take the exam.

Check Examplify's minimum system requirements online for hardware, microphone, webcam, and internet upload speed requirements.

UNIVERSITY POLICIES

Up to date university policies are available from the Office of Undergraduate Education, and these policies apply to this course. You can view the following statements and policies:

- Academic Misconduct
- Artificial Intelligence and Academic Integrity
- Copyright
- Counseling and Consultation Services/Mental health statement
- Creating an environment free from harassment, discrimination, and sexual misconduct
- Disability Statement (with accommodations for COVID)
- Diversity Statement
- Grievances and solving problems.
- Lyft Ride Smart

RELIGIOUS ACCOMMODATIONS

- Weather / Short-term closing

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement **and** the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

YOUR MENTAL HEALTH-COUNSELING AND CONSULTATION SERVICES

The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you are a student in the School of Health and Rehabilitation Sciences, you may schedule an appointment with our mental health counselors: simply email hrscom.counseling@osumc.edu, indicate which program you are enrolled in and that you are interested in scheduling an initial counseling appointment. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand.

You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 988 1-800-273-TALK or at 988lifeline.org.suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource.

SCHOOL SPECIFIC GRIEVANCE AND SOLVING PROBLEMS

: Please see HRS Student Handbook Policy #20 – Student Appeal Process. In general, a student should meet with the instructor of record for the course first and then, as outlined in Policy #20, a student should then take any problem or grievance to the Division Director.

CONDUCT IN THE CLASSROOM AND ACADEMIC LEARNING ENVIRONMENT

: Students will adhere to the code of student conduct for The Ohio State University at all times. Students in the School of HRS have additional professional requirements for behavior due to the nature of their professional training and the environments in which learning may occur. Please see HRS Student Handbook Policy # 5.

GRADING AND EVALUATION

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

ASSIGNMENT TYPE

- **Independent Work:** Strictly non-collaborative, original-individual work. You may discuss this assignment only with your instructor. Discussions with other individuals, either in person or electronically, are strictly prohibited.
- **Collaboration Required:** An explicit expectation for collaboration among students either in-class or outside (i.e. group work).
- **Optional-Collaboration:** Students are permitted, but not required, to discuss the assignment or ideas with each other. However, all submitted work must be one's original and individual creation.

Course grade will be based on:

Assignment Name	Points / Weight
Participation	10%
Activities	20%
Carmen Quizzes	10%
Exams (4)	40%
Final Exam	20%
TOTAL COURSE POINTS**Total**	**100%**

COURSE ASSIGNMENTS

Descriptions for assignment or category of assignments, including expectations about individual vs. collaborative work, relative weight toward the course grade, and information about the length and format of all papers.

Activities

Carmen Quizzes

Exams

Final Exam

GRADING SCALE

A	A-	B+	B	B-	C+	C	C-	D+	D	E
93-100%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	61-66%	0-60%

ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, I will notify you as to which alternative methods of teaching will be offered to ensure continuity of instruction for this class. Communication will be via [CarmenCanvas, email or other mode of communication].

ABSENCE AND MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

LATE ASSIGNMENT SUBMISSIONS

Late submissions will not be accepted. Please refer to Carmen for due dates.

COURSE SCHEDULE

Week #	Dates	Topic	Readings	Assignments Due
1		Stress Echocardiography		
2		Stress Echocardiography		
3		Stress Echocardiography		
4		Transesophageal Echocardiography		
5		Transesophageal Echocardiography		
6		3-D imaging Echo		
7		3-D imaging Echo		
8		Advanced Procedures		
9		Advanced Procedures		
10		Advanced Procedures		
11		Presentations		
12		Presentations		

Week #	Dates	Topic	Readings	Assignments Due
13		Industry guest presentation		
14		Review		
Finals		Insert Final Exam Day and Time		

Learning Objectives:

1. Describe the purpose of stress echocardiography.
2. Differentiate between the indications of exercise versus pharmacologic stress echocardiography.
3. Name common pharmacological agents used in stress echocardiography.
4. Identify the equipment necessary for stress echocardiographic examinations.
5. Explain the protocol for stress echocardiography.
6. Name the pre-echocardiographic and post-echocardiographic views used in stress testing.
7. Identify wall motion abnormalities seen on a stress echocardiogram.
8. Identify major coronary arteries associated with 16- and 17-segment perfusion model.
9. Describe the purpose, protocol, clinical indications, and equipment for a transesophageal echocardiography (TEE).
10. List the clinical indications, advantages, and limitations for real time 3-D imaging echocardiography.
11. Sequence the set-up and imaging procedure for administering contrast.
12. List the various contrast agents used in the clinical setting and differentiate between the types of contrast.
13. Describe clinical indications, contraindications, and appropriate equipment settings for the use of contrast.
14. Describe advanced techniques/procedures that can be used in echocardiography.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 4511

Cardiac Abnormalities and Interventions with the Application of Ultrasound

Spring

3 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Study of systemic disease, cardiac transplantation, and structural interventions involved with cardiac sonography.

PREREQUISITES

Designed for Junior Radiologic Sciences and Therapy students. Admission into the Radiologic Sciences & Therapy Division Sonography Program and successful completion of Fundamentals of the Heart Anatomy and Echocardiography.

COURSE LEARNING OUTCOMES

This course was designed based upon the content outline and guidelines provided by the American Registry of Diagnostic Medical Sonographers (ARDMS) in Adult Echocardiography and the Joint Review Commission on Education in Diagnostic Medical Sonography (JRC-DMS).

Upon completion of Cardiac Disease with Assessment of Ultrasound I, the student will be able to:

1. Identify and interpret key echocardiographic findings associated with cardiac involvement in systemic diseases such as amyloidosis, carcinoid, sarcoidosis, hypereosinophilia, hemochromatosis, connective tissue disorders, endocrine diseases, and vasculitis.

2. Identify primary indications for cardiac transplantation, discuss surgical techniques utilized in the procedure, describe potential complications post-transplantation, and recognize key echocardiographic findings associated with cardiac transplantation.
3. Analyze and interpret common cardiac abnormalities resulting from cardiac trauma, including echocardiographic findings and the physiology of athlete's heart.
4. Describe the basic principles of radiation, radiation safety, and regulatory issues related to radiation safety identify and describe structural heart abnormalities that are amenable to repair using transcatheter techniques, understand the importance of echocardiography in assessing these interventions, and explain the various transcatheter based interventions available for treating these abnormalities.

COURSE POLICIES

All School and Program course policies apply to this course. SHRS Handbooks are available. These provide all required policies and procedures required for students accepted into SHRS academic programs.

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- Lyft Ride Smart

RELIGIOUS ACCOMMODATIONS

- Weather / Short-term closing

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SCHOOL SPECIFIC GRIEVANCE AND SOLVING PROBLEMS

: Please see HRS Student Handbook Policy #20 – Student Appeal Process. In general, a student should meet with the instructor of record for the course first and then, as outlined in Policy #20, a student should then take any problem or grievance to the Division Director.

CONDUCT IN THE CLASSROOM AND ACADEMIC LEARNING ENVIRONMENT

: Students will adhere to the code of student conduct for The Ohio State University at all times. Students in the School of HRS have additional professional requirements for behavior due to the nature of their professional training and the environments in which learning may occur. Please see HRS Student Handbook Policy # 5.

GRADING AND EVALUATION

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

ASSIGNMENT TYPE

- **Independent Work:** Strictly non-collaborative, original-individual work. You may discuss this assignment only with your instructor. Discussions with other individuals, either in person or electronically, are strictly prohibited.
- **Collaboration Required:** An explicit expectation for collaboration among students either in-class or outside (i.e. group work).
- **Optional-Collaboration:** Students are permitted, but not required, to discuss the assignment or ideas with each other. However, all submitted work must be one's original and individual creation.

Course grade will be based on:

Assignment Name	Points / Weight
Participation	10%
Activities	20%
Carmen Quizzes	10%
Exams (4)	40%
Final Exam	20%
TOTAL COURSE POINTS**Total**	**100%**

COURSE ASSIGNMENTS

Descriptions for assignment or category of assignments, including expectations about individual vs. collaborative work, relative weight toward the course grade, and information about the length and format of all papers.

Activities

Carmen Quizzes

Exams

Final Exam

GRADING SCALE

A	A-	B+	B	B-	C+	C	C-	D+	D	E
93-100%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	61-66%	0-60%

ATTENDANCE / PARTICIPATION EXPECTATIONS

Example policies for weather or other short-term closing:

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

ABSENCE AND MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

LATE ASSIGNMENT SUBMISSIONS

Late submissions will not be accepted. Please refer to Carmen for due dates.

COURSE SCHEDULE

Week #	Dates	Topic	Readings	Assignments Due
1		Cardiac Abnormalities of Systemic Disease		
2		Cardiac Abnormalities of Systemic Disease		
3		Cardiac Abnormalities of Systemic Disease		
4		Considerations: Cardiac Transplantation		
5		Considerations: Cardiac Transplantation		
6		Considerations: Cardiac Transplantation		
7		Cardiac Trauma		
8		Cardiac Trauma		

Week #	Dates	Topic	Readings	Assignments Due
9		Considerations: Athlete's heart		
10		Considerations: Athlete's heart		
11		Transcatheter techniques		
12		Transcatheter techniques		
13		TBD		
14		Review		
Finals		Insert Final Exam Day and Time		

Learning Objectives:

1. List common cardiac abnormalities resulting from the following systemic diseases: amyloidosis, carcinoid, sarcoidosis, hypereosinophilia, hemochromatosis, connective tissue disorders, endocrine diseases, and vasculitis.
2. Discuss the pathophysiology of the following systemic diseases: amyloidosis, carcinoid, sarcoidosis, hypereosinophilia, hemochromatosis, connective tissue disorders, endocrine diseases, and vasculitis.
3. Describe typical clinical presentations and key echocardiographic findings associated with cardiac involvement in systemic disease.
4. List primary indications for cardiac transplantation.
5. Describe surgical techniques and complications in cardiac transplantation.
6. Describe key echocardiographic findings associated with cardiac transplantation.
7. List common cardiac abnormalities and common echocardiographic findings resulting from cardiac trauma.
8. Discuss the physiology and common echocardiographic findings of athlete's heart.
9. Describe the basic principles of radiation, radiation safety, and radiation safety techniques and regulations.
10. Describe structural heart abnormalities that could be repaired with transcatheter techniques.
11. Describe the role of echocardiography in assessing transcatheter based interventions.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 4889

Cardiac Sonography Practicum II

Autumn 2026

7 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Cardiac Sonography students develop the skill and art of creating cardiac sonography images through patient interaction and creating performing sonographic studies.

PREREQUISITES

Admission into the Radiologic Sciences & Therapy Division Sonography Program and successful completion of Cardiac Sonography Practicum I.

COURSE LEARNING OUTCOMES

Upon completion of Cardiac Sonography Practicum II, the student will be able to address these topics:

1. Students will demonstrate professional conduct in sonography practice by prioritizing patient privacy, security, and comfort while effectively coordinating clinical information to ensure patient safety and quality health care.
2. Students will demonstrate the ability to accurately identify cardiac anatomy and limited pathology from sonographic patient cases, apply patient history information to exams, ensure proper patient preparations, and position patients effectively for exams.

3. Students will demonstrate proficiency in verbal and written communication using appropriate sonography terminology, recognize critical echocardiographic findings, apply proper ergonomic techniques, and position patients effectively for optimal results in sonography exams.
4. Students should demonstrate the ability to accurately measure blood pressure, interpret readings, understand contraindications for echocardiographic procedures, identify types of medical emergencies in the lab, and effectively manage these emergencies, as well as utilize various measurement techniques for the heart's chambers, vessels, and valves.
5. Students will demonstrate proficiency in interpreting EKG findings, placing EKG leads correctly, managing intravenous lines, measuring pressure half-time, planimetry, arterial pressure, diameter, and shunt ratios, as well as understanding the types and applications of saline and echo-enhancing contrast agents, including recognizing contraindications.
6. Students will demonstrate proficiency in obtaining standard echocardiographic views, modifying views as needed, utilizing non-imaging transducers, understanding ultrasound console settings and their functions, recognizing artifacts and adjusting scanning techniques accordingly, and optimizing imaging, including Doppler, to enhance diagnostic accuracy.

COURSE POLICIES

All School and Program course policies apply to this course. SHRS Handbooks are available. These provide all required policies and procedures required for students accepted into SHRS academic programs.

Students may use Red Button to report academic and learning environment concerns to the School of Health and Rehabilitation Sciences Assistant Dean for Academic Affairs and the Assistant Dean for Diversity and Inclusion. You may choose to remain, who will respond quickly and efficiently to all reports. Note that specific follow-up can only be provided if a student chooses to report their name; anonymous reports will be reviewed but if you provide your contact details, individualized follow-up can be provided. When you complete a report with the Red Button System, the Directors for Academic Affairs and Diversity & Inclusion receive the report and will review within 72 hours. students will not be contacted.

COURSE TECHNOLOGY

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. IT support hours are available onlineStandard support hours are available online, and support for urgent issues is available 24 hours a day, seven days per week. 24x7.

Self-Service and Chat support: go.osu.edu/IT • Phone: 614-688-HELP (4357)

Email: ServiceDesk@osu.edu • TDD: 614-688-8743

Internet requirements:

Minimum WiFi speed of 3 MB/s is required for using CarmenCanvas to submit assignments, while a minimum 7 MB/s is recommended for Zoom classes, streaming lectures, etc. Students can connect devices to campus wireless internet, eduroam, by navigating to wireless.osu.edu.

Microsoft 365

This course requires students to author documents using Microsoft 365. Students can login to Microsoft 365 via microsoft365.osu.edu. Check the university's IT Service Desk knowledge base article KB04728, FAQ on Office 365 for Students, for information on hardware requirements.

Honorlock

Examplify (ExamSoft)

This course uses Honorlock to remotely Examplify to proctor oneon or more quizzes and exams. Check Honorlock's minimum system requirements onlineExamplify's minimum system requirements online for hardware, microphone, webcam, and internet upload speed requirements.

Students may request an in-person proctoring alternative to Honorlock or other online proctoring tools. The student is expected to contact the instructor as soon as possible to coordinate the accommodation. Students will not be permitted to take remotely proctored exams in their homes or residence halls unless they are willing to conduct a room scan. By choosing to take the exam in their home or residence hall, the student is consenting to the room scan of the area in which they take the exam.

UNIVERSITY POLICIES

Up to date university policies are available from the Office of Undergraduate Education, and these policies apply to this course. You can view the following statements and policies:

- Academic Misconduct
- Artificial Intelligence and Academic Integrity
- Copyright
- Counseling and Consultation Services/Mental health statement
- Creating an environment free from harassment, discrimination, and sexual misconduct
- Disability Statement (with accommodations for COVID)
- Diversity Statement
- Grievances and solving problems.
- Lyft Ride Smart
    - Religious accommodations
- Weather / Short-term closing

RELIGIOUS ACCOMODATIONS

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in

turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

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A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement **and** the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

YOUR MENTAL HEALTH-COUNSELING AND CONSULTATION SERVICES

The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you are a student in the School of Health and Rehabilitation Sciences, you may schedule an appointment with our mental health counselors: simply email hrscom.counseling@osumc.edu, indicate which program you are enrolled in and that you are interested in scheduling an initial counseling appointment. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand.

You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 988 orat 1-800-273-TALK or at 988lifeline.orgsuicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource.

SCHOOL SPECIFIC GRIEVANCE AND SOLVING PROBLEMS

Please see HRS Student Handbook: Please see HRS Student Handbook Policy #20 – Student Appeal Process. In general, a student should meet with the instructor of record for the course first and then, as outlined in Policy #20, a student should then take any problem or grievance to the Division Director.

CONDUCT IN THE CLASSROOM AND ACADEMIC LEARNING ENVIRONMENT

: Students will adhere to the code of student conduct for The Ohio State University at all times. Students in the School of HRS have additional professional requirements for behavior due to the nature of their professional training and the environments in which learning may occur. Please see HRS Student Handbook Policy # 5.

GRADING AND EVALUATION

Each participant is required to spend approximately 24 hours per week in a sonography clinic and actively participate in all facets of the service. Upon completion of this course, each student should submit:

1. **Evaluations** completed in the E*Value system; including, but not limited to:
    a. Clinical site orientation and student goals (rotation week 1)
    b. Student self-assessment (within 3 days of the last day of that rotation)
    c. Student evaluation of site (within 3 days of the last day of that rotation)
        i. Assigning affective evaluations to clinical instructor(s). An affective evaluation must be assigned by the student to *at least one clinical instructor both at the mid-point and end of each clinical rotation.* These must be assigned within **3 days** of the automated reminder date from E-value.

2. **Instructorship Hours (CME) form(s)** completed in the E-Value system
    a. CME distribution must be assigned by the student to all sonographers who they have worked with during each rotation. It is the student's responsibility to record and keep track of how many hours they have spent (up to 6) with each clinical instructor and identify on the CME coursework form in E-value at the end of the rotation.
    b. CMEs must be assigned **within three (3) days after the last day of that rotation.**

3. **Clinical Proficiency (or clinical competency)** evaluations completed in the E*Value system.

    A clinical instructor in a designated clinical affiliate or a faculty member in the Laboratory for Investigative Imaging will complete. This will serve as a formative evaluation for each student. See Clinical Proficiency Requirements below for competency requirements.

4. **Clinical log** is to be kept with exam information and/or sample images for instructor evaluation. Students must keep a thorough record of all exams in which they are involved throughout each clinical day. This includes exams in which they observe, assist, post-scan, or perform with limited supervision. The student must also submit a completed **procedure template** to the program director and/or clinical coordinator at the end of the semester.

Attendance and time tracking verified by the clinical instructor via E*Value system

5. **Active participation**; including, but not limited to: time tracking of hours spent in the lab, engagement with instructors and other students, files and worksheets uploaded to Carmen.

Final Grades will be based on the following percentages:

Clinical Evaluations		**50%**
Clinical Goals	5%	
Self-assessment	5%	
Evaluation of site	5%	
Affective CI Evaluation	5%	
Instructorship Hours (CME)	5%	
Proficiencies (Comps)	25%	

Attendance/ participation		**50%**
Clinical Log	25%	
Time Tracking & Attendance	25%	
	Total	**100%**

Failure to complete any items included in the course assessment will subject the student to a reduction of points from their grade as outlined below, and an official warning with future occurrence leading to a professional probation and disenrollment.

GRADING SCALE

Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

ASSIGNMENT TYPE

- **Independent Work:** Strictly non-collaborative, original-individual work. You m… only with your instructor. Discussions with other individuals, either in person o… prohibited.
- **Collaboration Required:** An explicit expectation for collaboration among stud… outside (i.e. group work).
- **Optional-Collaboration:** Students are permitted, but not required, to discuss the assignment or ideas with each other. However, all submitted work must be one's original and individua… creation.

Rusnak, Sarah
2024-07-19 15:16:00

This section may be removed; it is optional.

Assignment NameA	Points / WeightA-	Assignment TypeB+	B	B-	C+	C	C-	D+	D	E
100 - 93%	92.9-90%	89.9-87%	86.9-83%	82.9-80%	79.9-77%	76.9-73%	72.9-70%	69.9-67%	66.9-60%	60% and below

Please Note: Possible Grade Deductions

- **Punctuality** at clinical is mandatory. ***Clocking in more than 5 minutes past your scheduled shift due to reporting late to your clinical site is considered tardy for the day.***
  - 3 tardies will result in a full letter grade reduction and recommendation for professional probation.
  - 5 or more tardies will result in an "E" for the course, and recommendation for professional probation
- If the student forgets to clock in or out 4 or more times, this will result in a full letter grade reduction. 5 or more of these occurrences will result in an "E" for the course, and recommendation for professional probation

- Students are permitted **8.5 hours of free time** from their scheduled clinical hours for the semester. Scheduled absences, choosing to leave early, doctor's appointments, and illness are all included in these hours.
    - Each hour missed outside of the student's free hours, or documented illness/emergency will result in a 4-point reduction from the attendance portion of their grade
- Failure to include E-value comments for reasons outlined in student responsibilities above will result in a one-point reduction from the attendance portion of their grade for each of these occurrences.
- ALL clinical competencies, affective evaluations, timekeeping materials, scheduled and make-up hours, Instructorship CMEs must be completed by the last day of finals for the semester.
    - Evaluations and competencies not assigned by this date will not be counted toward the student's final grade.
- Furthermore, if a clinical instructor from the university visits your site during a scheduled clinical time and you are not present, it will result in a full letter grade deduction. NO EXCEPTIONS. It is the student's responsibility to inform the Clinical Coordinator of any absence from clinical, including leaving clinical early.

CLINICAL PROFICIENCY REQUIREMENTS

Students will be required to obtain the following clinical proficiencies in the areas of **Cardiac sonography** throughout the semester. Proficiencies will be awarded by the clinical site instructor and confirmed by the clinical coordinator.

The below table demonstrates the different levels of competencies within the E*Value online system and the expected minimum proficiencies to be earned this semester in each category. Categories are based on scanning skill and the amount a student performs for the selected exam. The percentage that is recorded should be based on a collaborative agreement between student and instructor. However, the designated CI for each exam will ultimately report the percentage of the exam and decide if the student passes the exam. Furthermore, competencies should commensurate with those exams being recorded in the clinical log. Failure to obtain a diverse set of comps reflecting the student's clinical log may result in point reduction. Please check with the clinical coordinator if you have any concerns or questions.

	Student Role (percentage)			
Proficiency	25%	50%	75%	100%
	1	4	5	5

ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

ABSENCE AND MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

LATE ASSIGNMENT SUBMISSIONS

Late assignments will not be accepted.

COURSE SCHEDULE

Students must pass these comps in order to receive credit. Failure to obtain all of the required clinical proficiencies will result in a 10% grade deduction for each one missing. Furthermore, missed proficiencies are expected to be made up the next clinical semester.

LIST OF CLINICAL PROFICIENCIES

The proficiencies below are provided in the E*Value online system within the PXDX tile. Students may choose from the following exams, including elective proficiencies. However, the main focus for this semester should be on the primary proficiencies in each concentration.

ADULT CARDIAC CONCENTRATON

		Insert Final Exam Day and Time**PROFICIENCIES** • 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 systolic and diastolic ventricular function • Evaluation of the severity of valve stenosis and regurgitation • Evaluation of normal and abnormal prosthetic valves, assist devices and interventional procedures • Stress echocardiography – exercise • Stress echocardiography – pharmacologic • Transthoracic enhanced echocardiogram • Complete transthoracic echocardiogram – Normal • Systolic dysfunction • Diastolic dysfunction • Aortic valve or aortic root pathology • Mitral valve pathology • Right heart pathology • Cardiomyopathy • Pericardial pathology • Prosthetic valve • Coronary artery disease • Contrast-enhanced echocardiography (observe)		

STUDENT RESPONSIBILITIES

- Each student is responsible for:
  - Wearing required PPE in clinical each day
  - Completing their assigned clinical rotation and lab sessions and documenting all required hours by adhering to the time tracking procedures outlined below. **Successful completion of clinical rotations includes the student's arrangement of transportation to and from all assigned clinical sites.**
  - Performing specified competency and affective evaluations
  - Conforming to the rules and regulations of the clinical affiliate assignment
  - Adhering to the school dress code as outlined in the Radiologic Sciences & Therapy handbook
  - Attending and participating in all scheduled laboratory activities and turning in lab assignments

- If the student is not able to meet the responsibilities for reasons beyond his/her control*, the student must meet with the Program Director about these circumstances and request, in writing, a grade of incomplete for the course.*
    - Failure to request incomplete will result in the awarding of an unsatisfactory grade (E) for the semester.
- Incomplete grades shall be awarded ONLY under circumstances which the Instructor considers legitimate, as in the case of documented illness, death in the family, jury duty, etc. (Rules of the University Faculty).
- NO incompletes will be issued for reasons other than those situations which are similar to the examples listed or deemed appropriate by the instructor.
- **THE USE OF CELLULAR PHONES IN THE CLINICAL AND LABORATORY SETTING IS STRICTLY FORBIDEN.**
    - Clinical Instructors and Radiologic Sciences faculty have the authority to report students who have their cell phones out during clinical rotations. The Instructor will inform the Clinical Coordinator and send the student home for the day. The hours missed will count as an unexcused absence. In addition, A FULL LETTER GRADE DEDUCTION WILL ALSO BE APPLIED TO THE STUDENTS OVERALL GRADE.
    - Students CAN have their cell phones out during their lunch break.
    - If a student has an emergency (ill family member, sick child, etc.), the student should inform the Clinical Instructor at the beginning of their clinical rotation about having their cell phone on them for a potential important phone call. This is handled on an individual basis.
- The student **must** clock in using the E*Value reporting system when arriving and leaving clinical rotations and scheduled scan labs (http://www.e-value.net).
    - Students MUST use a computer at their clinical site when clocking in and out of E-value. **CELL PHONES AND MOBILE DEVICES ARE NOT PERMITTED to be used for clocking in and out of E-value at clinical sites**, unless required by the clinical instructor at that site.
    - Students should clock in and out via cell phone using the E*Value app when arriving for scheduled scan labs. The clinical site selection should be “OSU Laboratory for Investigative Imaging” and the instructor should be the Radiologic Sciences faculty member present during the lab session.
    - If E*Value is not available that day, you must have time documented when arriving and leaving by the clinical instructor via email. **You must also notify your Clinical Coordinator in writing, via e-mail, with the date(s) that time cards were used within 24 hours of the end of that clinical shift.**
    - If you forget to clock in or out of E*Value or a computer is not available when your shift begins or ends, you **must** make sure to make a note in the “comment” section in the E*Value system explaining this occurrence.
    - If the sonography staff is leaving for the day ***more than 15 minutes*** prior to the end of the student’s 8.5 hour shift, you **must** make sure to make a note in the “comment” section in the E*value system.
- **In the event of absence** from clinical ***both the clinical assigned area and the division faculty must be notified*** prior to the scheduled clinical time by phone or professional e-mail.
    - It is the student’s responsibility to obtain contact information for the Clinical Instructors at their sites in order to notify them of absence.
    - Unless otherwise instructed, ALL occurrences of clinical absence must be reported by the student in an e-mail addressed to **Jodi Eshleman and Rachel Pargeon** (see contact information above)
    - ***Contacting a Clinical Instructor or faculty member on their cell phone is for EMERGENCIES ONLY.***
    - **OUTSIDE OF THE STUDENT’S FREE HOURS, THE ONLY MISSED CLINICAL HOURS WHICH ARE PERMITTED TO BE MADE UP ARE THOSE WITH DOCUMENTED ILLNESSES OR**

DOCTOR'S VISITS AND FAMILY EMERGENCIES. All other missed hours will be considered, on an individual basis, in calculating your course grade.

- Any paperwork associated with documented illnesses and doctor's visits must be turned in to the course instructor within 24 hours of the student's return
- Any make-up hours must be discussed with both the clinical instructor at the site and the course instructor prior to attending make-up clinical. ALL occurrences of make-up hours must be reported by the student in an e-mail addressed to Clinical Coordinator (see contact information above)

- **ANY student not following the above procedure shall be subject to a reduction of points in the time tracking category and/or attendance category as outlined below, and an official warning with future occurrence leading to professional probation and disenrollment.**

COPYRIGHT

THIS SYLLABUS, THE COURSE ELEMENTS, POLICIES, AND SCHEDULE ARE SUBJECT TO CHANGE.

THE OHIO STATE UNIVERSITY
SCHOOL OF HEALTH AND REHABILITATION SCIENCES

COURSE INFORMATION

Radiologic Sciences & Therapy 4989

Cardiac Sonography Practicum III

Spring 2026

9 Credit Hours

FACULTY INFORMATION

Instructor: Name

Department:

Office Location:

Phone Number:

Email:

Office Hours:

OPTIONAL TEACHING ASSOCIATES:

COURSE DESCRIPTION

Cardiac Sonography students develop the skill and art of creating cardiac sonography images through patient interaction and creating performing sonographic studies.

PREREQUISITES

Admission into the Radiologic Sciences & Therapy Division Sonography Program and successful completion of Cardiac Sonography Practicum II.

COURSE LEARNING OUTCOMES

Upon completion of Cardiac Sonography Practicum III, the student will be able to address these topics:

1. Students will demonstrate professional conduct in sonography practice by prioritizing patient privacy, security, and comfort while effectively coordinating clinical information to ensure patient safety and quality health care.
2. Students will demonstrate the ability to accurately identify cardiac anatomy and limited pathology from sonographic patient cases, apply patient history information to exams, ensure proper patient preparations, and position patients effectively for exams.

3. Students will demonstrate proficiency in verbal and written communication using appropriate sonography terminology, recognize critical echocardiographic findings, apply proper ergonomic techniques, and position patients effectively for optimal results in sonography exams.
4. Students should demonstrate the ability to accurately measure blood pressure, interpret readings, understand contraindications for echocardiographic procedures, identify types of medical emergencies in the lab, and effectively manage these emergencies, as well as utilize various measurement techniques for the heart's chambers, vessels, and valves.
5. Students will demonstrate proficiency in interpreting EKG findings, placing EKG leads correctly, managing intravenous lines, measuring pressure half-time, planimetry, arterial pressure, diameter, and shunt ratios, as well as understanding the types and applications of saline and echo-enhancing contrast agents, including recognizing contraindications.
6. Students will demonstrate proficiency in obtaining standard echocardiographic views, modifying views as needed, utilizing non-imaging transducers, understanding ultrasound console settings and their functions, recognizing artifacts and adjusting scanning techniques accordingly, and optimizing imaging, including Doppler, to enhance diagnostic accuracy.

COURSE POLICIES

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With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement **and** the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity.

YOUR MENTAL HEALTH-COUNSELING AND CONSULTATION SERVICES

The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you are a student in the School of Health and Rehabilitation Sciences, you may schedule an appointment with our mental health counselors: simply email hrscom.counseling@osumc.edu, indicate which program you are enrolled in and that you are interested in scheduling an initial counseling appointment. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand.

You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 988 orat 1-800-273-TALK or at 988lifeline.orgsuicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource.

SCHOOL SPECIFIC GRIEVANCE AND SOLVING PROBLEMS

Please see HRS Student Handbook: Please see HRS Student Handbook Policy #20 – Student Appeal Process. In general, a student should meet with the instructor of record for the course first and then, as outlined in Policy #20, a student should then take any problem or grievance to the Division Director.

CONDUCT IN THE CLASSROOM AND ACADEMIC LEARNING ENVIRONMENT

: Students will adhere to the code of student conduct for The Ohio State University at all times. Students in the School of HRS have additional professional requirements for behavior due to the nature of their professional training and the environments in which learning may occur. Please see HRS Student Handbook Policy # 5.

GRADING AND EVALUATION

Each participant is required to spend approximately 32 hours per week in a sonography clinic and actively participate in all facets of the service. Upon completion of this course, each student should submit:

1. **Evaluations** completed in the E*Value system; including, but not limited to:
    a. Clinical site orientation and student goals (rotation week 1)
    b. Student self-assessment (within 3 days of the last day of that rotation)
    c. Student evaluation of site (within 3 days of the last day of that rotation)
        i. Assigning affective evaluations to clinical instructor(s). An affective evaluation must be assigned by the student to *at least one clinical instructor both at the mid-point and end of each clinical rotation.* These must be assigned within **3 days** of the automated reminder date from E-value.

2. **Instructorship Hours (CME) form(s)** completed in the E-Value system
    a. CME distribution must be assigned by the student to all sonographers who they have worked with during each rotation. It is the student's responsibility to record and keep track of how many hours they have spent (up to 6) with each clinical instructor and identify on the CME coursework form in E-value at the end of the rotation.
    b. CMEs must be assigned **within three (3) days after the last day of that rotation.**

3. **Clinical Proficiency (or clinical competency)** evaluations completed in the E*Value system.

    A clinical instructor in a designated clinical affiliate or a faculty member in the Laboratory for Investigative Imaging will complete. This will serve as a formative evaluation for each student. See Clinical Proficiency Requirements below for competency requirements.

4. **Clinical log** is to be kept with exam information and/or sample images for instructor evaluation. Students must keep a thorough record of all exams in which they are involved throughout each clinical day. This includes exams in which they observe, assist, post-scan, or perform with limited supervision. The student must also submit a completed **procedure template** to the program director and/or clinical coordinator at the end of the semester.

Attendance and time tracking verified by the clinical instructor via E*Value system

5. **Active participation**; including, but not limited to: time tracking of hours spent in the lab, engagement with instructors and other students, files and worksheets uploaded to Carmen.

Final Grades will be based on the following percentages:

Clinical Evaluations		**50%**
Clinical Goals	5%	
Self-assessment	5%	
Evaluation of site	5%	
Affective CI Evaluation	5%	
Instructorship Hours (CME)	5%	
Proficiencies (Comps)	25%	

Attendance/ participation		**50%**
Clinical Log	25%	
Time Tracking & Attendance	25%	
	Total	**100%**

Failure to complete any items included in the course assessment will subject the student to a reduction of points from their grade as outlined below, and an official warning with future occurrence leading to a professional probation and disenrollment.

GRADING SCALE

A	A-	B+	B	B-	C+	C	C-	D+	D	E
100 - 93%	92.9-90%	89.9-87%	86.9-83%	82.9-80%	79.9-77%	76.9-73%	72.9-70%	69.9-67%	66.9-60%	60% and below

Please Note: Possible Grade Deductions

- **Punctuality** at clinical is mandatory. ***Clocking in more than 5 minutes past your scheduled shift due to reporting late to your clinical site is considered tardy for the day.***
    - 3 tardies will result in a full letter grade reduction and recommendation for professional probation.
    - 5 or more tardies will result in an "E" for the course, and recommendation for professional probation
- If the student forgets to clock in or out 4 or more times, this will result in a full letter grade reduction. 5 or more of these occurrences will result in an "E" for the course, and recommendation for professional probation
- Students are permitted **10.5 hours of free time** from their scheduled clinical hours for the semester. Scheduled absences, choosing to leave early, doctor's appointments, and illness are all included in these hours.
    - Each hour missed outside of the student's free hours, or documented illness/emergency will result in a 4-point reduction from the attendance portion of their grade
- Failure to include E-value comments for reasons outlined in student responsibilities above will result in a one-point reduction from the attendance portion of their grade for each of these occurrences.
- ALL clinical competencies, affective evaluations, timekeeping materials, scheduled and make-up hours, Instructorship CMEs must be completed by the last day of finals for the semester.
    - Evaluations and competencies not assigned by this date will not be counted toward the student's final grade.
- Furthermore, if a clinical instructor from the university visits your site during a scheduled clinical time and you are not present, it will result in a full letter grade deduction. NO EXCEPTIONS. It is

the student's responsibility to inform the Clinical Coordinator of any absence from clinical, including leaving clinical early.

CLINICAL PROFICIENCY REQUIREMENTS

Students will be required to obtain the following clinical proficiencies in the areas of **Cardiac sonography** throughout the semester. Proficiencies will be awarded by the clinical site instructor and confirmed by the clinical coordinator.

The below table demonstrates the different levels of competencies within the E*Value online system and the expected minimum proficiencies to be earned this semester in each category. Categories are based on scanning skill and the amount a student performs for the selected exam. The percentage that is recorded should be based on a collaborative agreement between student and instructor. However, the designated CI for each exam will ultimately report the percentage of the exam and decide if the student passes the exam. Furthermore, competencies should commensurate with those exams being recorded in the clinical log. Failure to obtain a diverse set of comps reflecting the student's clinical log may result in point reduction. Please check with the clinical coordinator if you have any concerns or questions.

	Student Role (percentage)			
Proficiency	25%	50%	75%	100%
	0	0	15	20

ATTENDANCE / PARTICIPATION EXPECTATIONS

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

ABSENCE AND MAKEUP POLICY

Instructors will only accept makeup work if absence is excused with documentation

LATE ASSIGNMENT SUBMISSIONS

Late assignments are not accepted.

COURSE SCHEDULE

Students must pass these comps in order to receive credit. Failure to obtain all of the required clinical proficiencies will result in a 10% grade deduction for each one missing. Furthermore, missed proficiencies are expected to be made up the next clinical semester.

LIST OF CLINICAL PROFICIENCIES

The proficiencies below are provided in the E*Value online system within the PXDX tile. Students may choose from the following exams, including elective proficiencies. However, the main focus for this semester should be on the primary proficiencies in each concentration.

ADULT CARDIAC CONCENTRATON

		PROFICIENCIES • 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 systolic and diastolic ventricular function • Evaluation of the severity of valve stenosis and regurgitation • Evaluation of normal and abnormal prosthetic valves, assist devices and interventional procedures • Stress echocardiography – exercise • Stress echocardiography – pharmacologic • Transthoracic enhanced echocardiogram • Complete transthoracic echocardiogram – Normal • Systolic dysfunction • Diastolic dysfunction • Aortic valve or aortic root pathology • Mitral valve pathology • Right heart pathology • Cardiomyopathy • Pericardial pathology • Prosthetic valve		

		• Coronary artery disease • Contrast-enhanced echocardiography (observe)		

STUDENT RESPONSIBILITIES

- Each student is responsible for:
  - Wearing required PPE in clinical each day
  - Completing their assigned clinical rotation and lab sessions and documenting all required hours by adhering to the time tracking procedures outlined below. **Successful completion of clinical rotations includes the student's arrangement of transportation to and from all assigned clinical sites.**
  - Performing specified competency and affective evaluations
  - Conforming to the rules and regulations of the clinical affiliate assignment
  - Adhering to the school dress code as outlined in the Radiologic Sciences & Therapy handbook
  - Attending and participating in all scheduled laboratory activities and turning in lab assignments
- If the student is not able to meet the responsibilities for reasons beyond his/her control*, the student must meet with the Program Director about these circumstances and request, in writing, a grade of incomplete for the course.*
  - Failure to request incomplete will result in the awarding of an unsatisfactory grade (E) for the semester.
- Incomplete grades shall be awarded ONLY under circumstances which the Instructor considers legitimate, as in the case of documented illness, death in the family, jury duty, etc. (Rules of the University Faculty).
- NO incompletes will be issued for reasons other than those situations which are similar to the examples listed or deemed appropriate by the instructor.
- **THE USE OF CELLULAR PHONES IN THE CLINICAL AND LABORATORY SETTING IS STRICTLY FORBIDEN.**
  - Clinical Instructors and Radiologic Sciences faculty have the authority to report students who have their cell phones out during clinical rotations. The Instructor will inform the Clinical Coordinator and send the student home for the day. The hours missed will count as an unexcused absence. In addition, A FULL LETTER GRADE DEDUCTION WILL ALSO BE APPLIED TO THE STUDENTS OVERALL GRADE.
  - Students CAN have their cell phones out during their lunch break.
  - If a student has an emergency (ill family member, sick child, etc.), the student should inform the Clinical Instructor at the beginning of their clinical rotation about having their cell phone on them for a potential important phone call. This is handled on an individual basis.
- The student **must** clock in using the E*Value reporting system when arriving and leaving clinical rotations and scheduled scan labs (http://www.e-value.net).
  - Students MUST use a computer at their clinical site when clocking in and out of E-value. **CELL PHONES AND MOBILE DEVICES ARE NOT PERMITTED to be used for clocking in and out of E-value at clinical sites**, unless required by the clinical instructor at that site.
  - Students should clock in and out via cell phone using the E*Value app when arriving for scheduled scan labs. The clinical site selection should be "OSU Laboratory for Investigative Imaging" and the instructor should be the Radiologic Sciences faculty member present during the lab session.
  - If E*Value is not available that day, you must have time documented when arriving and leaving by the clinical instructor via email. **You must also notify your Clinical Coordinator in writing, via e-**

mail, with the date(s) that time cards were used within 24 hours of the end of that clinical shift.

- If you forget to clock in or out of E*Value or a computer is not available when your shift begins or ends, you **must** make sure to make a note in the "comment" section in the E*Value system explaining this occurrence.
- If the sonography staff is leaving for the day ***more than 15 minutes*** prior to the end of the student's 8.5 hour shift, you **must** make sure to make a note in the "comment" section in the E*value system.

- **In the event of absence** from clinical ***both the clinical assigned area and the division faculty must be notified*** prior to the scheduled clinical time by phone or professional e-mail.
  - It is the student's responsibility to obtain contact information for the Clinical Instructors at their sites in order to notify them of absence.
  - Unless otherwise instructed, ALL occurrences of clinical absence must be reported by the student in an e-mail addressed to **Jodi Eshleman and Rachel Pargeon** (see contact information above)
  - ***Contacting a Clinical Instructor or faculty member on their cell phone is for EMERGENCIES ONLY.***
  - **OUTSIDE OF THE STUDENT'S FREE HOURS, THE ONLY MISSED CLINICAL HOURS WHICH ARE PERMITTED TO BE MADE UP ARE THOSE WITH DOCUMENTED ILLNESSES OR DOCTOR'S VISITS AND FAMILY EMERGENCIES. All other missed hours will be considered, on an individual basis, in calculating your course grade.**
  - Any paperwork associated with documented illnesses and doctor's visits must be turned in to the course instructor within 24 hours of the student's return
  - Any make-up hours must be discussed with both the clinical instructor at the site and the course instructor prior to attending make-up clinical. ALL occurrences of make-up hours must be reported by the student in an e-mail addressed to Clinical Coordinator (see contact information above)
- **ANY student not following the above procedure shall be subject to a reduction of points in the time tracking category and/or attendance category as outlined below, and an official warning with future occurrence leading to professional probation and disenrollment.**

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