

SONOGRAPHY - ECHOCARDIOGRAPHY TECHNOLOGY

ASSOCIATE OF APPLIED SCIENCE (AAS) - 60 CREDITS

About this program

Sonography is a noninvasive imaging technology that visualizes the body's tissue and organs with sound waves to assist in diagnosing diseases. Echocardiography (ultrasound of the heart) is a specialized field of sonography that requires professional training to assist physicians in diagnosing diseases and assessing overall cardiac health. The Echocardiography Technology program prepares students to become entry-level cardiac sonographers competent in the cognitive (knowledge), psychomotor (skills) and affective (behavior) learning domains of professional echocardiography. This program includes training for an in-demand practice area that meets a healthcare workforce need and complements existing allied health programs at M State. Upon successfully completing coursework and clinical experiences, students will have developed the minimum knowledge and competencies to sit for registry exams in the echocardiography profession. Moreover, the student will have the opportunity to learn to work effectively with other allied healthcare professionals, patients and families to promote patient safety, diagnosis and recovery.

Program outcomes

1. Participate as an active healthcare team member, demonstrating professional behavior, communication and collaboration.
2. Demonstrate proficient use of echocardiography technology, equipment, supplies and instruments.
3. Demonstrate professional and ethical behaviors consistent with the role of an echocardiography technician.
4. Demonstrate effective communication with patients, families and other members of a cardiovascular team.
5. Demonstrate respect for individual patients, maintaining their dignity, rights and beliefs.
6. Demonstrate problem-solving and critical thinking to improve the health of patients and the broader community.

Curriculum overview

Crds	Requirement type
60	Required courses
60	Total

Developmental courses note: A student may be required to enroll in developmental courses in reading, writing and math. A student's scores on the Accuplacer assessment will determine enrollment in developmental courses. The purpose of developmental courses is to prepare students for the demands of a college-level curriculum. *Credits may vary.*

Accreditation: Minnesota State Community and Technical College is accredited by the Higher Learning Commission, a regional accreditation agency recognized by the U.S. Department of Education. The Higher Learning Commission 230 South LaSalle Street, Suite 7-500 Chicago, IL 60604-1411 <http://www.ncahigherlearningcommission.org> Phone: 312.263.0456 / 800.621.7440

Curriculum requirement details

Required courses

Course	Crds
BIOL2260 - Human Anatomy and Physiology I	3
BIOL2261 - Human Anatomy and Physiology I Lab	1
BIOL2262 - Human Anatomy and Physiology II	3
BIOL2263 - Human Anatomy and Physiology II Lab	1
COMM1140 - Interpersonal Communication	3
ECHO1100 - Adult Echocardiography I	3
ECHO1105 - Adult Echocardiography Lab I	3
ECHO1110 - Adult Echocardiography II	3
ECHO1115 - Adult Echocardiography Lab II	3
ECHO1120 - Ultrasound Physics and Instrumentation I	3
ECHO1125 - Ultrasound Physics and Instrumentation II	3
ECHO2100 - Adult Echocardiography III	3
ECHO2110 - Ultrasound Physics Review	2
ECHO2200 - Adult Echocardiography Clinical I	7
ECHO2210 - Adult Echocardiography Clinical II	10
ENGL1101 - College Writing	3
PHIL1200 - Applied and Professional Ethics	3
PSYC1200 - General Psychology	3

Other requirements or restricted electives

Course summaries

BIOL2260 - Human Anatomy and Physiology I **(3 credits)**

Meets MnTC Goal Area 3. This course is a comprehensive introductory overview of human anatomy and physiology that includes basic fundamental concepts of cell biology, tissues and organs making up the integumentary, skeletal, muscular and nervous systems. It is the first of a two-semester sequence in which anatomy and physiology are studied with an emphasis on structure and functions of systems. This course contains a lab-like component.

Prerequisites:

- Assessment into ENGL 1101 or college level writing equivalent.

BIOL2261 - Human Anatomy and Physiology I Lab **(1 credits)**

Meets MnTC Goal Area 3 when taken with BIOL 2260. This course is the laboratory component of a comprehensive introductory overview of human anatomy and physiology that includes basic fundamental concepts of cell biology, tissues and organs making up the integumentary, skeletal, muscular and nervous systems. This course is the first of a two-semester sequence in which anatomy and physiology are studied with an emphasis on structure and functions of systems.

Prerequisites:

- Assessment into ENGL 1101 or College Level writing equivalent.

Corequisites:

- BIOL 2260

BIOL2262 - Human Anatomy and Physiology II **(3 credits)**

Meets MnTC Goal Area 3. This course is a continuation of Anatomy and Physiology I. Topics will include the study of cells, tissues and organs making up the endocrine, cardiovascular, lymphatic and immune, respiratory, digestive, urinary and reproductive systems. Emphasis is on the structure and function of included systems. This course contains a lab-like component.

Prerequisites:

- Assessment into ENGL 1101 or college level writing equivalent.
- BIOL2260

BIOL2263 - Human Anatomy and Physiology II Lab **(1 credits)**

Meets MnTC Goal Area 3 when taken with BIOL 2262. This course is the laboratory component of a comprehensive introductory overview of human anatomy and physiology that includes basic fundamental concepts of cells, tissues and organs making up the endocrine, cardiovascular, respiratory, digestive, urinary and reproductive systems. This course is the second of a two-semester sequence in which anatomy and physiology are studied with an emphasis on structure and functions of systems.

Prerequisites:

- Assessment into ENGL 1101 or College Level writing equivalent.
- BIOL2260
- BIOL2261

Corequisites:

- BIOL2262

COMM1140 - Interpersonal Communication **(3 credits)**

Meets MnTC Goal Area 1. This course will focus on improving students' abilities to communicate effectively in one-to-one dyadic encounters by providing experience-based instruction. Extensive in-class and out-of-class analyses allow the student to examine his/her own and others' informal social interactions. The long-term goal is for the student to apply interpersonal communication theories to daily interactions and draw his/her own conclusions about the effectiveness of interpersonal communication.

Prerequisites:

- Assessment into ENGL 1101

ECHO1100 - Adult Echocardiography I **(3 credits)**

This course will cover the anatomy of the cardiovascular system. Students will learn the cardiac cycle, including event timing, heart and vascular pressure, cardiac chamber quantification, and electrophysiology. Also included in this course is an introduction to the two-dimensional ultrasound appearance of cardiac anatomy, including abnormalities detected by adult transthoracic echocardiography.

ECHO1105 - Adult Echocardiography Lab I (3 credits)
 This course provides hands-on learning in an echocardiography laboratory as simulated in a clinical environment. Students familiarize with ultrasound imaging equipment, system controls, transducer position, and scanning techniques following an adult transthoracic echocardiography exam protocol.

Corequisites:

- ECHO1100

ECHO1110 - Adult Echocardiography II (3 credits)
 This course includes an in-depth review of the pathophysiology of heart disease and the role of ultrasound diagnosis and treatment. Topics include measurements of cardiac chamber size, calculations of valve area, hemodynamics, estimation of regurgitation, evaluation of native valve disease, evaluation of pericardial disease, prosthetic valves, aortic disease, cardiomyopathies and evaluation of cardiac tumors.

Prerequisites:

- ECHO1100
- ECHO1105

ECHO1115 - Adult Echocardiography Lab II (3 credits)
 Students will continue to build on the ultrasound scanning skills learned in ECHO1100. Content includes the development of a full adult transthoracic echocardiography scanning protocol. In addition, students will learn the required measurements to determine the severity of cardiovascular disease.

Prerequisites:

- ECHO1100
- ECHO1105

Corequisites:

- ECHO1110

ECHO1120 - Ultrasound Physics and Instrumentation I (3 credits)
 Students will apply the principles of ultrasound, sound propagation, pulsed-echo instrumentation, image formation, transducers and system operation to the interpretation of sonographic information and image methodology. Integrating these theories and abstract principles with their practice clinical applications will be emphasized.

Corequisites:

- ECHO1100
- ECHO1105

ECHO1125 - Ultrasound Physics and Instrumentation II (3 credits)
 This course continues exploration of the theoretical and abstract principles that form the technological basis of diagnostic medical sonography. Topics include Doppler physics and instrumentation, artifacts, quality assurance and hemodynamics. Physics applications and collaborative learning will be highly emphasized.

Prerequisites:

- ECHO1100
- ECHO1105
- ECHO1120

Corequisites:

- ECHO1110
- ECHO1115

ECHO2100 - Adult Echocardiography III (3 credits)
 This course includes an in-depth review of the pathophysiology of heart disease, including congenital heart defects. The role of ultrasound enhancement agents and exercise echocardiography is discussed. Quantitative echocardiography is addressed, including regurgitation assessment, 3D imaging and transesophageal echocardiography.

Prerequisites:

- ECHO1110
- ECHO1115
- ECHO1125

ECHO2110 - Ultrasound Physics Review (2 credits)

This course is the cumulative preparation for the national credentialing board examinations in ultrasound physics and instrumentation. It involves real-world applications of physics, artifact recognition and rectification, and instrumentation of ultrasound equipment. Students will participate in interactive mock examinations in preparation for the credentialing examinations. Activities include a review of complex echocardiography cases that require critical thinking skills.

Prerequisites:

- ECHO1100
- ECHO1105
- ECHO1110
- ECHO1115
- ECHO1125

Corequisites:

- ECHO2100

ECHO2200 - Adult Echocardiography Clinical I (7 credits)

This course provides a supervised clinical practicum that prepares students to develop cognitive, psychomotor and affective learning domains for adult transthoracic echocardiography. Students demonstrate increasing proficiency in the required echocardiography imaging modalities that will allow them to achieve clinical competency.

Prerequisites:

- ECHO1100
- ECHO1105
- ECHO1110
- ECHO1115
- ECHO1125

Corequisites:

- ECHO2100
- ECHO2110

ECHO2210 - Adult Echocardiography Clinical II (10 credits)

This course provides a continued supervised clinical practicum, increasing proficiency in diagnosing advanced cardiovascular disease. The final goal of this course is to achieve the competency level required to work as an entry-level cardiac sonographer.

Prerequisites:

- ECHO2200

ENGL1101 - College Writing (3 credits)

Meets MnTC Goal Area 1. This is an introductory writing course designed to prepare students for later college and career writing. The course focuses on developing fluency through a process approach, with particular emphasis on revision. Students will consider purpose and audience, read and discuss writing and further develop their own writing processes through successive revisions to produce polished drafts. Course work will include an introduction to argumentative writing, writing from academic sources and a short research project.

Prerequisites:

- Completion of ELL1080, ENGL0096, or ENGL0097 with a grade of C or higher OR placement into college-level English.

PHIL1200 - Applied and Professional Ethics (3 credits)

Meets MnTC Goal Areas 2 and 9. In this course students will explore ethical issues that arise in professional settings including business, medical and technical settings. The course will also look at the philosophical underpinnings of current professional policies and how philosophy can offer insights that can enhance and deepen such policies.

PSYC1200 - General Psychology (3 credits)

Meets MnTC Goal Areas 5 and 9. This is a comprehensive introductory overview of psychology that studies human behavior and mental processes. Topics include (but are not limited to) research methods, the history of psychology, neuroscience and behavior, developmental psychology, sensation and perception, motivation and emotion, health psychology, learning and memory, personality, social psychology, psychopathology and treatments, and states of consciousness such as sleep and dreams.

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Program Plan — "Primary"

Locations: Fergus Falls

1st Fall Term (16 credits)

Courses

Course	Crds
BIOL2260 - Human Anatomy and Physiology I	3
BIOL2261 - Human Anatomy and Physiology I Lab	1
ECHO1100 - Adult Echocardiography I	3
ECHO1105 - Adult Echocardiography Lab I	3
ECHO1120 - Ultrasound Physics and Instrumentation I...	3
ENGL1101 - College Writing	3

1st Spring Term (13 credits)

Courses

Course	Crds
BIOL2262 - Human Anatomy and Physiology II	3
BIOL2263 - Human Anatomy and Physiology II Lab	1
ECHO1110 - Adult Echocardiography II	3
ECHO1115 - Adult Echocardiography Lab II	3
ECHO1125 - Ultrasound Physics and Instrumentation II..	3

2nd Fall Term (15 credits)

Courses

Course	Crds
COMM1140 - Interpersonal Communication	3
ECHO2100 - Adult Echocardiography III	3
ECHO2110 - Ultrasound Physics Review	2
ECHO2200 - Adult Echocardiography Clinical I	7

2nd Spring Term (16 credits)

Courses

Course	Crds
ECHO2210 - Adult Echocardiography Clinical II	10
PHIL1200 - Applied and Professional Ethics	3
PSYC1200 - General Psychology	3