SONOGRAPHY - ECHOCARDIOGRAPHY TECHNOLOGY

ASSOCIATE OF APPLIED SCIENCE (AAS) – 70 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
70	Required courses
70	**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
ECHO1050 - Intro to Echocardiographic Anatomy and Physiology	1
ECHO1055 - Intro to Echocardiographic Views	1
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
ECHO2105 - Adult Echocardiography Lab III	2
ECHO2200 - Adult Echocardiography Clinical I	7
ECHO2220 - Adult Echocardiography Review	1
ECHO2225 - Adult Echocardiography Clinical II	11
HLTH1116 - Medical Terminology	3
PHIL1200 - Applied and Professional Ethics	3
PHYS1105 - Fundamental Concepts in Physics	3
PSYC1101 - Human Interaction	3
SOC1111 - Introduction to Sociology	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

ECHO1050 - Intro to Echocardiographic Anatomy and Physiology ..... ***(1 credits)***
This course will provide an introduction to anatomy of the cardiovascular system. Students will be introduced to the cardiac cycle, heart and vascular pressures, and the basics of electrophysiology. Students will also learn the medical terminology associated with the cardiovascular system and anatomical locations.

ECHO1055 - Intro to Echocardiographic Views ..... ***(1 credits)***
This course provides hands-on learning in an echocardiography laboratory as simulated in a clinical environment. Students will be introduced to ultrasound imaging equipment, transducer position, echocardiographic views and scanning techniques following an adult transthoracic two-dimensional echocardiography exam protocol. Students will also become familiar with transducer motions associated with echocardiographic imaging.

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

ECHO2105 - Adult Echocardiography Lab III ..... ***(2 credits)***
Students will continue to build on the ultrasound scanning skills learned in ECHO1105 and ECHO1115. Content includes continued skill enhancement of a full adult transthoracic echocardiography scanning protocol. In addition, students will continue to master the content of the required measurements to determine the severity of cardiovascular disease.

Prerequisites:

- ECHO1100
- ECHO1100
- ECHO1110
- ECHO1115
- ECHO1120
- 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 allow them to achieve clinical competency.

Prerequisites:

- ECHO2100
- ECHO2105

ECHO2220 - Adult Echocardiography Review ..... ***(1 credits)***
Students will review material learned in ECHO1100, ECHO1110 and ECHO2100. This course will cover material to prepare students for the National Registry exam. Students will review cardiac anatomy, physiology, heart and vascular pressures, chamber quantification, system operations, scanning views with associated anatomy, Color/Spectral Doppler and quantification of abnormal findings.

Prerequisites:

- ECHO1100
- ECHO1105
- ECHO1110
- ECHO1115
- ECHO1120
- ECHO1125
- ECHO2100

Corequisites:

- ECHO2210

ECHO2225 - Adult Echocardiography Clinical II ..... ***(11 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

HLTH1116 - Medical Terminology ..... ***(3 credits)***
This course covers prefixes, suffixes and root words used to compose medical terms. The student learns to spell, pronounce, define, analyze and formulate terminology related to body structure, disease, diagnosis and treatment. Medical abbreviations are also included.

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.

PHYS1105 - Fundamental Concepts in Physics ..... ***(3 credits)***
Meets MnTC Goal Area 3. This is a demonstration-based course that provides an introduction to selected topics in classical and modern physics. Topics will include measurement and significant digits, graphing, dimensional analysis, mechanics of motion, vibrations, waves, sound, electricity and magnetism, light and optics, atomic physics and atomic spectra, lasers and optical fibers, nuclear physics and radiation. The course uses active learning techniques with lab-like experiences. It uses many demonstrations and instructor-guided small group problem-solving activities. Simple algebra is used to ensure that students grasp the course concepts. This course is intended for all students but is especially designed for non-science majors who want an appreciation of and a limited working knowledge in some major areas of physics.

Prerequisites:

- MATH0095

PSYC1101 - Human Interaction ..... ***(3 credits)***
Meets MnTC Goal Areas 2 and 5. This is an introductory course emphasizing practical applications of psycho-social concepts, with specific emphasis on personality development, human relations and motivation. This course is applicable for students in occupational and health-related fields or general education.

SOC1111 - Introduction to Sociology ..... ***(3 credits)***
Meets MnTC Goal Areas 2, 5 and 7. This course is an introduction to the study of societies and the social factors that influence individual and group behavior. The course incorporates sociological and other critical thinking models for the investigation of various components of social life: culture, socialization, social organization, social stratification, social institutions, populations dynamics and social change.

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Program Plan — "Adult Echocardiography"

Locations: Fergus Falls

1st Fall Term (10 credits)

Courses

Course	Crds
BIOL2260 - Human Anatomy and Physiology I	3
BIOL2261 - Human Anatomy and Physiology I Lab	1
HLTH1116 - Medical Terminology	3
PHYS1105 - Fundamental Concepts in Physics	3

1st Spring Term (12 credits)

Courses

Course	Crds
BIOL2262 - Human Anatomy and Physiology II	3
BIOL2263 - Human Anatomy and Physiology II Lab	1
COMM1140 - Interpersonal Communication	3
ECHO1050 - Intro to Echocardiographic Anatomy and Physiology	1
ECHO1055 - Intro to Echocardiographic Views	1
PHIL1200 - Applied and Professional Ethics	3

2nd Fall Term (12 credits)

Courses

Course	Crds
ECHO1100 - Adult Echocardiography I	3
ECHO1105 - Adult Echocardiography Lab I	3
ECHO1120 - Ultrasound Physics and Instrumentation I	3
SOC1111 - Introduction to Sociology	3

2nd Spring Term (12 credits)

Courses

Course	Crds
ECHO1110 - Adult Echocardiography II	3
ECHO1115 - Adult Echocardiography Lab II	3
ECHO1125 - Ultrasound Physics and Instrumentation II	3
PSYC1101 - Human Interaction	3

3rd Fall Term (12 credits)

Courses

Course	Crds
ECHO2100 - Adult Echocardiography III	3
ECHO2105 - Adult Echocardiography Lab III	2
ECHO2200 - Adult Echocardiography Clinical I	7

3rd Spring Term (12 credits)

Courses

Course	Crds
ECHO2220 - Adult Echocardiography Review	1
ECHO2225 - Adult Echocardiography Clinical II	11