

RADIOLOGIC SCIENCES

Radiologic sciences at North Dakota State University combines foundational science, math, and general education courses on campus with applied imaging classroom, lab, and clinical education during a two-year full-time internship within an affiliated hospital. Three unique and specialized internships available to RS majors are radiography, diagnostic medical sonography, and echocardiography.

Background Information

Radiographers, also known as **radiologic technologists**, perform diagnostic imaging examinations, accurately position patients, obtain quality diagnostic images, and adhere to radiation protection regulations for themselves, their patients, and coworkers. They work closely with radiologists, the physicians who interpret medical images, to diagnosis or rule out disease or injury. Radiologic technologists are educated in anatomy, patient positioning, examination techniques, equipment protocols, radiation safety, radiation protection and basic patient care. To become a registered radiologic technologist, RT(R), students must complete an accredited educational program, earn an academic degree, and pass a national certification examination. To remain registered, they must earn continuing education credits.

Radiologic technologists work in hospitals, physician offices and clinics, or diagnostic imaging centers. Multi-skilled RT(R)s who are educated and credentialed in more than one type of imaging technique are most marketable. With experience and additional training, general radiographers may become specialists in CT, magnetic resonance imaging, mammography, interventional radiography, or advance into management or education. Radiation therapy, sonography, and nuclear medicine typically require additional specialized formal education in a dedicated training program. Currently there are job openings throughout the country. According to the U.S. Department of Labor Bureau of Labor Statistics, employment of radiologic technologists is expected to grow faster than average for all occupations through 2026. An increase in medical conditions among the aging baby-boom population will require imaging as a tool to making diagnoses. Mean annual earnings for radiologic technologists in 2018 was \$61,540 (www.bls.gov/oes/2018/may/oes292034.htm).

Sonographers use special equipment and high-frequency sound waves (ultrasound) to obtain images of internal body structures and organs. They have a high level of patient interaction and play a vital role in providing the physician with quality images to interpret, assess, and diagnose medical conditions or conduct surgical procedures. Two options for NDSU students interested in sonography are echocardiography and diagnostic medical sonography. **Echocardiographers**, also known as cardiac sonographers, evaluate the anatomy and hemodynamics (blood flow) of the heart, its chambers and valves, and related blood vessels. **Diagnostic medical sonographers** evaluate abdominal structures like the kidney, liver, and spleen, breast tissue, the reproductive system, blood vessels, fetal development, and musculoskeletal structures like tendons and joints. Sonographers are educated in anatomy and pathophysiology, patient positioning, examination techniques, equipment protocols, and basic patient care and safety. To become registered, students must complete an accredited educational program and pass national certifying

examinations. To remain registered, they must earn continuing education credits.

Sonographers work in hospitals, physician offices, and medical and diagnostic laboratories. Currently there are job openings throughout the country. According to the U.S. Department of Labor Bureau of Labor Statistics, the demand for sonographers will continue to grow much faster than average for all occupations through 2026. This demand is attributed to the likelihood that the need to diagnose medical conditions within an aging baby-boom population will increase, as well as, the continued need for ultrasound as an alternative to imaging that involves radiation. Mean annual wages for diagnostic medical sonographers in 2018 was \$73,860 (www.bls.gov/oes/2018/may/oes292032.htm).

The Program

A Bachelor of Science degree, major in Radiologic Sciences, includes two or more years of rigorous academic courses on campus followed by a two-year full-time professional-level internship in an affiliated hospital-based program. RS students must have an interest and aptitude in the sciences and math and a strong desire to work directly with patients. Academic courses include chemistry, physics, anatomy and physiology, microbiology, trigonometry, psychology, statistics, and computer sciences, in addition to general education courses. Students pursuing any one of the three specializations in radiography, echocardiography, or diagnostic medical sonography will complete the same pre-radiologic sciences college courses. Transfer students must complete a minimum of 12-20 resident credits at NDSU prior to the start of the internship. Residency requirements vary by RS specialization. During their final year of courses on campus, qualified students will apply for the two-year internship. The internship class and clinical education prepares the graduate to work in their respective area of specialization in radiography, diagnostic medical sonography, or echocardiography. College courses and the internship classes, lab, and clinical education constitute the four-year degree awarded by NDSU. Radiography graduates are eligible to take the national certifying exam administered by the American Registry of Radiologic Technologists to earn the RT(R) credential. Sonography graduates are eligible to take national certifying exams appropriate to their specialization and administered by the American Registry for Diagnostic Medical Sonography.

Internship Application and Admission

The internship application process begins annually in the fall. Internship admission is competitive. Admission criteria are established in collaboration with affiliated hospital programs and generally includes successful completion of all college courses on campus with a minimum grade of C, grade point averages (a minimum of 2.50-3.00 is required and varies by hospital program), references, related experience, interview and ability to meet program-designated technical standards, or request accommodations to execute those skills. Technical standards include a sound intellect and emotional health to exercise good judgment even in emergencies, visual and hearing acuity, physical abilities to lift and position patients, pull, push, carry equipment, enter data, stand and walk for extended periods of times and communicate effectively. In addition, students must also comply with criminal background and student conduct requirements.

Radiography. Pre-RS students who apply and are accepted into the radiography internship will complete their applied classroom and clinical education in one of the following affiliated hospital-based radiologic technology programs: Avera McKennan Hospital (Sioux Falls, SD), Mercy/St Luke’s Hospitals (Cedar Rapids, IA), Sanford Medical Center (Bismarck and Fargo, ND, Sioux Falls, SD), St. Cloud Hospital (St. Cloud, MN), St. Luke’s College (Sioux City, IA), UnityPoint Health (Des Moines, IA), and the Veteran Affairs Medical Center (Minneapolis, MN). Affiliated hospital programs maintain programmatic accreditation through the Joint Review Committee on Education in Radiologic Technology. Internship classes and clinical experience will focus on patient care, anatomy and physiology, radiation physics and protection, imaging principles, positioning, radiobiology, and pathology.

Sonography. Pre-RS students who apply and are accepted into one of the sonography specializations will complete the 21-month internship offered by Sanford Medical Center Fargo. Internship classes, scanning labs, and clinical experience for echocardiography will focus on adult echocardiography with rotations in pediatric and stress echo. Internship classes, scanning labs, and clinical experience in diagnostic medical sonography will focus on the abdomen, OB/GYN, small parts, and vascular sonography. SMCF’s sonography programs are accredited by the Commission on Accreditation of Allied Health Education Programs.

It is highly recommended that students interested in an RS major meet with the RS advisor at least one year prior to anticipated internship application to discuss areas of specialization, internship admission, and create a plan of study for successful completion of degree requirements. Information about the RS professions and specializations, curriculum, internship, and advising contacts are available from the NDSU Department of Allied Sciences.

Radiologic Sciences Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year					
Fall	Credits	Spring		Credits	
CHEM 117 Chemical Concepts and Applications	3	BIOC 260 Elements of Biochemistry		4	
CHEM 117L Chem Concepts and Applications Lab	1	COMM 110 Fundamentals of Public Speaking		3	
CHP 190 Critical Thinking and Academic Success	2	Gen Ed Humanities & Fine Arts/Gen Ed Cultural Diversity		3	
CSCI 114 Microcomputer Packages	3	MICR 202 Introductory Microbiology		2	
ENGL 110 College Composition I	4	MICR 202L Introductory Microbiology Lab		1	
MATH 105 Trigonometry	3	PSYC 111 Introduction to Psychology		3	
Gen Ed Wellness		ENGL 120 College Composition II		3	
	18			19	
Second Year					
Fall	Credits	Spring		Credits	
BIOL 220 Human Anatomy and Physiology I	3	BIOL 221 Human Anatomy and Physiology II		3	
BIOL 220L Human Anatomy and Physiology I Laboratory	1	BIOL 221L Human Anatomy and Physiology II Laboratory		1	
Gen Ed Humanities & Fine Arts	3	CHP 125 Medical Terminology for Health Professionals		1	
PHYS 211 College Physics I	3	PHRM 170 Common Medicines & Diseases		2	
PHYS 211L College Physics I Lab	1	PHYS 212 College Physics II		3	
RS 200 Introduction to Radiologic Sciences	1	PHYS 212L College Physics II Laboratory		1	
Gen Ed Social & Behavioral Sciences/Gen Ed Global Perspectives	3	Special Elective (dept. approved)		3	
STAT 330 Introductory Statistics	3	Special Elective (dept. approved)		3	
	18			17	
Third Year					
Fall	Credits	Spring	Credits	Summer	Credits
RS 496 Field Experience	12-13	RS 496 Field Experience **	12-14	RS 496 Field Experience **	6-11
				Upper Division Writing (300-400 level)	3
	12-13		12-14		9-14
Fourth Year					
Fall	Credits	Spring	Credits	Summer	Credits
RS 496 Field Experience **	12	RS 496 Field Experience **	12	RS 496 Field Experience **	1-6
	12		12		1-6
Total Credits: 130-143					

** RS 496 classroom, lab, and clinical education (internship) takes place within an affiliated hospital. The internship is full-time for 21-24 months, including summer. RS 496 courses and credits vary by radiography, echocardiography, or diagnostic medical sonography specialization.

View NDSU equivalencies of transfer courses at: www.ndsu.edu/transfer/equivalencies

For Further Information

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DEPT WEBSITE: www.ndsu.edu/alliedsciences/

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