



RUSH UNIVERSITY
COLLEGE OF HEALTH SCIENCES

**RUSH UNIVERSITY
COLLEGE OF HEALTH SCIENCES**

Department of Medical Imaging Sciences

*Bachelor of Science Degree
Imaging Sciences
Program Catalog*

2018-2019

DEPARTMENT FACULTY

ACTING CHAIR PROGRAM DIRECTOR	Laura Vasquez, Ph.D., MS, RVT, RT, (R), (MR) Assistant Professor, Imaging Sciences Program
MEDICAL DIRECTOR:	Sharon E Byrd, MD, Chairperson Department of Diagnostic Radiology and Nuclear Medicine
CORE FACULTY	
CLINICAL COORDINATOR:	Victor Gorre, MBA, BS, RT, (R) (MR) (CT) Assistant Professor, Imaging Sciences Program
ASSISTANT PROFESSOR:	Eric Perczynski MHA, RT, (R) (CT) Imaging Sciences Program
ADJUNCT FACULTY	
ASSISTANT PROFESSOR:	Karen Jefferies, BS, RT, (R) Imaging Sciences Program
ASSISTANT PROFESSOR:	Brian J. Jegier, PhD Imaging Sciences Program
ASSISTANT PROFESSOR:	Chris Steelman MS, RT (R)(CI), RCIS Imaging Sciences Program
ASSISTANT PROFESSOR:	Mike Enriquez, MPA, BSRT(R)(CT) Imaging Sciences Program
LECTURER:	Steven Torres, BS, (MR) Imaging Sciences Program

CLINICAL AFFILIATES

Advocate BroMenn Medical Center

1304 Franklin Avenue
Normal, Illinois 61761
(309) 454-1400

Advocate Christ Medical Center

4440 West 95th Street
Oak Lawn, IL 60453
(708) 684-8000

Advocate Eureka Hospital

101 S Major Street
Eureka, Illinois 61530
(309) 467-2371

Advocate Lutheran General Hospital

Radiology Department CT
1775 W. Dumpster Street
Park Ridge, Illinois 60068
(847) 723-2210

Advocate Illinois Masonic Medical Center

836 W. Wellington Avenue
Chicago, Illinois 60657
(773) 975-1600

Ann & Robert H. Lurie Children's Hospital of Chicago

225 E. Chicago Avenue
Chicago, IL 60611
(312) 227-3395

Circle Imaging Center (RUMC)

Radiology Department (Suite 456)
1725 W. Harrison Street
Chicago, IL 60612
(312) 563-2694

Loyola University Health System

2160 South First Avenue
Maywood, IL 60153
(708) 216-9000

CLINICAL AFFILIATES

Rush Midwest Orthopedics

1611 W. Harrison
Chicago, IL 60612
(312) 942-5052

Rush Oak Park Hospital

520 S. Maple Ave.
Oak Park, IL 60304
(708) 660-4636

Rush University Medical Center

Diagnostic Services
1653 W. Congress Parkway
Chicago, IL 60612
(312) 947-0372

The University of Chicago Medical Center

5841 S. Maryland Avenue
Chicago, IL 60637
773-834-3953

University of Illinois Medical Center

Department of Radiology (MC 931)
1740 West Taylor Street, Suite 2488
Chicago, Illinois 60612
(866) 600-2273

Unitypoint Health Methodist

221 NE Glen Oak Avenue
Peoria, IL 61636
(309) 672- 5522

IMAGING SCIENCES PROGRAM

DEGREE OFFERED

Bachelor of Science in Imaging Sciences

STATEMENT OF EDUCATIONAL PHILOSOPHY

The Bachelor of Science in Imaging Sciences Program faculty shares a set of beliefs consistent with the philosophies and missions of Rush University and its clinical affiliates. The faculty believes that the knowledge, attitudes and skills required for professional medical imaging are best achieved through a combination of theory and related clinical experiences. Clinical application of theory based knowledge in the technical aspects of medical imaging, critical thinking, communication and quality patient care prepares students to become competent and compassionate professionals dedicated to a career of service to society. Learning is a life-long process promoted when intellectual inquiry, creativity, self-awareness, self-direction, maturity and responsibility are valued. This process results in positive attitude changes, knowledge acquisition and technical competence.

The Imaging Sciences Program is dedicated to the mission of the College of Health Sciences and Rush University in that it seeks to enroll a diverse student body in order to promote the values of diversity and inclusion of our program. The Bachelor of Science in Imaging Sciences Program is committed to preparing advanced-level imaging science professionals to provide high-quality, diagnostic and interventional imaging procedures to patients.

MISSION

The Bachelor of Science in Imaging Sciences degree program is dedicated to the mission of the College of Health Sciences and Rush University. The Bachelor of Science in Imaging Sciences degree is committed to preparing advanced-level imaging science professionals to provide high-quality, diagnostic and interventional imaging procedures to patients.

The mission of the Bachelor of Science in Imaging Sciences is to provide the highest quality of education to students through formal didactic and state-of-the-art clinical experiences that prepare our students to be imaging professionals, who are patient care focused, critical thinkers and engaged in lifelong learning. The program also seeks to enroll a diverse student body to promote the values of diversity and inclusion in our program.

VISION

The vision of the Imaging Sciences Program is to be a premier educational program in Imaging Sciences by providing innovative curricular, clinical and continuing education services to the diagnostic imaging community and the patients we serve. Our vision is to transform lives through academic excellence, innovation, and leadership.

VALUES

The Imaging Sciences faculty support the following values:

- Student learning through the effective use of available educational opportunities including
 - Entry-level professional programs, advanced level educational programs, and continuing education offerings.
 - Diverse patient populations.
 - Broad spectrum of technology and health facilities.
- Creative activity and research resulting from the collaboration of faculty and students.
- Ethical behavior and professional integrity in addition to technical competence.
- Civic engagement involved in collaborating with a variety of internal and external constituencies including health care facilities, and professional organizations.

GOALS

The Bachelor of Science in Imaging Sciences degree is dedicated to clinical and academic excellence in teaching, scholarship, service and patient care. The Imaging Sciences Program is designed to provide students with an outstanding education in preparation for a satisfying professional career as advanced Imaging Sciences practitioners as well as providing a foundation for leadership in management and supervision, education and clinical specialization.

The overall purpose of the program is to provide a high quality of education that is relevant and professionally sound to meet the advanced imaging needs in the health care community. Inherent in this purpose is the goal to prepare imaging sciences professionals who can demonstrate the knowledge, skills and professional competencies needed to perform advanced-level imaging in Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Cardiac-Interventional (CI), Vascular-Interventional (VI) and other advanced imaging modalities while completing their bachelor's degree.

STUDENT LEARNING OUTCOMES

At the end of this program, students/graduates will be able to:

1. Demonstrate a mastery of advanced medical imaging skills in either Magnetic Resonance Imaging (MRI), Computed Tomography (CT) or Cardiac or Interventional Radiography by producing diagnostic quality Computed Tomography (CT), Magnetic Resonance Imaging (MRI) or Interventional Angiographic procedures.
2. Apply proper positioning skills related to imaging procedures.
3. Select appropriate technical factors for imaging procedures.
4. Justify the appropriate use of magnetic fields and radio frequencies*
5. Select appropriate radiation protection practices on patients, self, and others**
6. Summarize patient history and interpret lab results pertinent to imaging procedures.
7. Evaluate image quality appropriately.

8. Modify standard procedures based on pathology, body habitus and non-routine situations.
9. Demonstrate effective use of oral and writing skills.
10. Create effective medical imaging case presentation studies.
11. Demonstrate critical thinking and problem-solving skills.
12. Demonstrate the value of professional development for patient care and medical imaging practices.
13. Demonstrate effective compassionate communication skills with diverse patient populations and support the core values of caring, integrity, and discovery.

*Magnetic Resonance Imaging (MRI) Students Only

**Computed Tomography (CT) and Cardiac-Interventional (CI) or Vascular-Interventional (VI) Radiography Students Only

IMAGING SCIENCES EDUCATION PROGRAM: PROGRAM OVERVIEW

ABOUT THE PROFESSION

Radiologic imaging science, also known as radiologic technology or medical radiography, is the allied health profession responsible for diagnostic and interventional medical radiographic imaging. Imaging sciences professionals, under the supervision of physicians, provide medical imaging services to patients.

THE PROGRAM

The Rush University Bachelor of Science in Imaging Sciences program offers an opportunity for registered radiologic technologists to advance their education by obtaining a Bachelor's degree and skills that are significant to their current profession. This program offers the radiologic technologist an opportunity for advancement in employment and prepares advanced medical imaging technologists for professional leadership roles. This academic degree program will provide graduates with the knowledge, skills and professional competencies needed to perform advanced-level imaging in Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Cardiac-Interventional (CI), Vascular-Interventional (VI) and other advanced imaging modalities.

The Bachelor of Science in Imaging Sciences is a career ladder program to provide advanced training and education for certified imaging technologists. In addition to the program prerequisites, the Bachelor of Science in Imaging Sciences degree program requires a minimum of 65 semester credit hours taken at the upper division undergraduate level. The professional phase of the program, which consists of Imaging Sciences course work and clinical fieldwork, is completed at Rush University and its affiliated clinical sites. The program is dedicated to clinical and academic excellence and includes more than 1000 hours of in-hospital clinical practice. As a leadership program in Imaging Sciences, the program is designed to provide graduates with the opportunity to gain the foundation needed to assume professional leadership roles in clinical practice, clinical specialty areas, education and management.

Students accepted into the professional phase normally begin course work in the fall quarter of the first year of the program, though students may begin taking classes at other times during the year with permission of the program director. Coursework in the professional phase may be taken on a full-time (over 24 months) or part-time basis. Each student will develop an individualized program to be approved by the program director. As a part of the program, graduates will complete the clinical training required to be eligible for post-primary pathway to certification in Computed Tomography, Magnetic Resonance Imaging, Cardiac-Interventional (CI) or Vascular-Interventional (VI) offered by the American Registry of Radiologic Technologists (ARRT).

*An entry-level Magnetic Resonance Imaging (MRI) track is available for students who are not licensed in radiography or nuclear medicine. Licensure or eligibility for accreditation in the practice of medical radiation technology by the Illinois Emergency Management Agency is not required for successful completion of the MRI track, as MRI is a non-ionizing imaging modality. The Magnetic Resonance Imaging (MRI) entry-level track is recognized as a MRI primary-pathway educational program by the American Registry of Radiologic Technologists (ARRT).

IMAGING SCIENCES EDUCATION PROGRAM: ADMISSION REQUIREMENTS

Requirements for admission to the professional phase of the program in imaging sciences include the following:

- Completion of 60 semesters or 90 quarter hours of college or university credit at a regionally accredited college or university
- Minimum overall GPA of at least 2.5 out of 4.0 in all college/university course work
- Prerequisite courses include English composition, college algebra, chemistry, human anatomy and physiology, physics, speech, humanities or social sciences, microbiology, statistics and computer science. Note: Some prerequisites may be taken concurrently while enrolled in the program—for more information, contact the program. All general education requirements must be met prior to the awarding of the bachelor's degree.
- Successful completion of program prerequisites with a grade of at least "C" or higher from a regionally accredited college or university
- Associate's degree in medical radiography or nuclear medicine technology (not applicable if applying to the entry-level MRI track) from a program accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT) or the Joint Review Committee on Educational Programs in Nuclear Medicine Technology (JRCNMT). Applicants who have successfully completed an accredited hospital-based program should contact the program director to determine if they may be admitted on this basis.
- Licensure or eligibility for accreditation in the practice of medical radiation technology by the Illinois Emergency Management Agency (not applicable if applying to the entry-level MRI track).

- Completed application to the program and submission of official transcripts for all college coursework completed
- An interview is scheduled for selected applicants following review of the application materials.
- Ability to perform the essential functions of the job
- All applicants whose native language is not English must present evidence of proficiency in English by satisfactorily completing the Test of English as a Foreign Language examination (TOEFL). More information about this policy is in the main College of Health Sciences section of this catalog.

General Education Requirements

Successful completion of general education course work in mathematics (college algebra or above), communications, humanities and biological, social and behavioral sciences as outlined below:

	Semester Credit Hours	Quarter Credit Hours
Communications (English, composition)	6	8
Speech (oral communication)	3	4
Mathematics (college algebra or higher)	3	4
Humanities, Philosophy or Ethics	6	8
Fine arts (may not include a performance class)	3	4
Social and Behavioral Sciences (must include at least one course in psychology)	9	12
Elective courses in Communications, Humanities, Fine Arts, Philosophy, Ethics, Social Sciences, Life Sciences, Physical Sciences or Computer Science to total 60 semester credit hours for the core general education requirements for the College.	4	17
TOTAL	34	57

	Semester Credit Hours	Quarter Credit Hours
Professional Prerequisites		
Human Anatomy and Physiology (or 4 hrs. Anatomy and 4 hrs. Physiology)	8	10
Chemistry (with Lab)	4	5
Physics (with Lab)	4	5
Medical Terminology	4	5
Computer Science (includes computer literacy)	3	4
Statistics	3	4
TOTAL	26	33
TOTAL GENERAL EDUCATION AND PROFESSIONAL PREREQUISITES	60	90

IMAGING SCIENCES EDUCATION PROGRAM: ACADEMIC POLICIES

Good Academic Standing

High academic performance is expected in required courses. If a student earns grades lower than “C” or their cumulative GPA falls below a 2.5, the student may not be permitted to register for subsequent courses and may be subject to dismissal from the program. Students who withdraw or who have been dismissed from the program must reapply and will be considered as a new applicant. Students requesting readmission must submit a letter to the college of Admissions.

Academic Probation

During the program, if a student’s performance is unsatisfactory (GPA less than 2.5 or a letter grade of less than “C”), he or she may not be permitted to register for subsequent classes. The student will be subject to dismissal from the program. If the student wishes to reenter the program, he or she must reapply and will be considered on the same basis as any new applicant. Students who voluntarily withdraw from the program, either passing or failing, have no guarantee of reinstatement to the program. Students requesting readmission to the program should submit a letter to that effect to the Committee on Progress and Promotion for Imaging Sciences.

Clinical Work

Students must maintain a cumulative GPA in the program of at least 2.5 unless otherwise described in each course syllabus, the minimum satisfactory grade for course credit is 75% (a letter grade of “C”), and all stipulated segments of a course must be passed by this standard. Students must demonstrate proficiency in all clinical skills presented to pass clinical courses. For all clinical courses, the final exam must be passed at the designated cut score and a grade of “C” or better must be maintained to successfully complete each clinical practice to continue in the program.

Imaging Sciences Program’s Technical Standards

Rush University is committed to diversity and to attracting and educating students who will make the population of health care professionals representative of the national population. Our core values — ICARE — Innovation, Collaboration, Accountability, Respect and Excellence translate into our work with all students, including those with disabilities.

Rush actively collaborates with students to develop innovative ways to ensure accessibility and creates a respectful accountable culture through our confidential and specialized disability support. Rush is committed to excellence in accessibility; we encourage students with disabilities to disclose and seek accommodations.

The following technical functions are required of all students enrolled in the Imaging Sciences Program:

Acquire information:

- Acquire information from demonstrations and experiences in courses such as lecture, group, and physical demonstrations.
- Acquire information from written documents and computer systems (e.g., literature searches & data retrieval).
- Identify information presented in accessible images from paper, slides, videos with audio description, and transparencies.
- Identify information presented in images from paper, slides, videos, and transparencies.
- Recognize and assess patient changes in mood, activity, cognition, verbal, and non-verbal communication.

Use and Interpret:

- Use and interpret information from assessment techniques/maneuvers. Use and interpret information related to physiologic phenomena generated from diagnostic tools

Motor:

- Possess psychomotor skills necessary to provide or assist in holistic imaging care and perform or assist with procedures and treatments.
- Practice in a safe manner and appropriately provide imaging care and assessment in emergencies and life support procedures and perform universal precautions against contamination.

Communication:

- Communicate effectively and sensitively with patients and families.
- Communicate effectively with faculty, preceptors, and all members of the healthcare team during practicum and other learning experiences.
- Accurately elicit information including a medical history and other information to adequately and effectively evaluate a population's, client's or patient's condition.

Intellectual ability:

- Measure, calculate, reason, analyze, and synthesize data related to diagnosis and treatment of patients and populations.
- Exercise proper judgment and complete responsibilities in a timely and accurate manner according to the Imaging Sciences role.
- Synthesize information, problem solve, and think critically to judge the most appropriate theory, assessment, or treatment strategy.

Behavioral:

- Maintain mature, sensitive, effective relationships with clients/patients, families, students, faculty, staff, preceptors and other professionals under all circumstances.
- Exercise skills of diplomacy to advocate for patients in need.

- Possess emotional stability to function under stress and adapt to rapidly changing environments inherent to the classroom and practice settings.

Character:

- Demonstrate concern for others, integrity, accountability, interest, and motivation are necessary personal qualities.
- Demonstrate intent and desire to follow the Rush University and Imaging Sciences Program's Code of Ethics.

The technical standards delineated above must be met with or without accommodation. Students who, after review of the technical standards, determine that they require accommodation to fully engage in the program, should contact the Office of Student Disability Services <https://www.rushu.rush.edu/office-student-disability-services> to confidentially discuss their accommodations needs. Given the clinical nature of our programs time may be needed to implement accommodations. Accommodations are never retroactive; therefore, timely requests are essential and encouraged.

Grievance Policy — Student Appeals

Normal communication regarding course or program policy should be first directed to the instructor assigned to the course or clinical section involved. If the student is unable to satisfy his or her inquiry or request at that level, the matter should be referred to either the clinical director (in the case of clinical practice) or the department chair (in the case of academic coursework or policy). If the matter in question cannot be resolved at that level, it should be directed to the Committee on Progress and Promotions for Imaging Sciences. This committee will either resolve the matter in question to the student's satisfaction or instruct the student on available mechanisms for appeal as described in the University Catalog and University Student Handbook.

Comprehensive Examination

At the end of the program, the student will complete an end-of-program competency assessment examination, as well as meet graduation and program completion requirements (see Graduation Requirements). Students who do not successfully complete the examination will receive an Incomplete for the third clinical rotation and will retake the examination prior to the beginning of the next quarter. Those failing the examination twice will be enrolled in a directed Independent Study during the next term for remediation. Those failing the examination on the third attempt will be subject to dismissal from the program. Those students may reapply to the program (see Procedures for Readmission).

College of Health Sciences/Rush University Academic Policies

Academic policies specific to the College of Health Sciences are located earlier in this catalog. In addition, the Academic Resources and Policies section of this catalog contains Rush University academic policies.

RUSH UNIVERSITY POLICIES AND PROCEDURES FOR STUDENTS WITH DISABILITIES

Part of Rush University's mission is to promote diversity among its student population and to provide equal access to its facilities, programs, services and learning opportunities. In keeping with this mission, the University encourages students with disabilities to engage the Office of Student Disability Services as soon as they begin their program.

Students should feel free to contact the Office of Student Disability Services at Rush University, to engage in a confidential conversation about the process for requesting accommodations in the classroom and clinical settings. Accommodations are not provided retroactively at the University. Additional information can be found online at the Office of Student Disability website or by contacting the Office of Student Disability Services.

In order to respect student's privacy and ensure a thoughtful interactive discussion, students should not make accommodation requests to individual faculty members, lecturers, or course directors, instead, please contact:

Marie Ferro-Lusk, MBA, MSW, LSW
Manager, Office of Student Disability Services

Rush University

600 S. Paulina St. Suite 440

Chicago, IL. 60612

Phone: (312) 942-5237

Fax: (312) 942-2778

Email: Marie_S_Ferro-Lusk@rush.edu

Website: <https://www.rushu.rush.edu/students-disabilities>

IMAGING SCIENCES PROGRAM CURRICULUM TRACKS

IS PROGRAM CURRICULUM FOR COMPUTED TOMOGRAPHY (CT) TRACK

Fall 1 year

IS 310 Sectional Anatomy & Pathology 5 SH

IS 314 Pathophysiology 4 SH

IS 337 Computed Tomography (CT) Physics 3 SH

IS 453 Computed Tomography Positioning and Protocols 3 SH

Total= 15 SH

Spring 1

IS 318 Patient Assessment 3 SH

IS 458 Leadership 3 SH

IS 331 Education 3 SH

IS 338 Advanced Radiation Biology 3 SH

Total 12 SH

Summer 1

IS 447 P Clinical Practicum I 6 SH

IS 448 Clinical Seminar I 3 SH

IS 325 Pharmacology and Radiologic Contrast Agents 3 SH

Total 12 SH

Fall 2

CHS 364 Health Care Systems and Policies 1 SH

IS 457 P Clinical Practicum II 6 SH

IS 449 Clinical Seminar II 3 SH

IS 463 Research & Statistical Methods 3 SH

Total= 13 SH

Spring 2

IS 467 P Clinical Practicum III 6 SH

IS 468 Clinical Seminar III 3 SH

IS 454 Health Care Ethics and Cultural Competence 4 SH

Total= 13 SH

Total = 65 SH

NOTE: All professional, leadership and clinical courses require a grade of “C” or better for the student to continue in the degree program course sequence with a major in Imaging Sciences.

Failure to complete an Imaging Sciences professional course with a letter grade of “C” or better will subject the student to review by the Committee on Progress and Promotions and may result in the student being dismissed from the program. Students readmitted to the program at times other than the fall quarter of the second year will pick up the course sequence as prescribed by the Committee on Progress and Promotions for Imaging Sciences.

IS PROGRAM CURRICULUM FOR MAGNETIC RESONANCE IMAGING (MRI) TRACK (ARRT STUDENTS)

Fall 1-year Credit by ARRT RT Proficiency

IS 305 Introduction to Imaging Sciences 3 SH

IS 307 Introduction to Patient Care 3 SH

Total 6 SH

Fall 1 year

IS 310 Sectional Anatomy & Pathology 5 SH

IS 463 Research & Statistical Methods 3 SH

IS 314 Pathophysiology 4 SH

Total 12 SH

Spring 1

IS 336 MRI Physics 5 SH

IS 318 Patient Assessment 3 SH

IS 444 MRI Positioning and Protocols 4 SH

Total 12 SH

Summer 1

IS 447 P Clinical Practicum I 6 SH

IS 448 Clinical Seminar I 3 SH

IS 325 Pharmacology and Radiologic Contrast Agents 3 SH

IS 340 MRI Safety 3 SH**Total 15 SH****Fall 2**

IS 458 Leadership 3 SH

CHS 364 Health Care Systems and Policies 1 SH

IS 457 P Clinical Practicum II 6 SH

IS 449 Clinical Seminar II 3 SH**Total 13 SH****Spring 2**

IS 454 Health Care Ethics and Cultural Competence 4 SH

IS 331 Education 3 SH

IS 467 P Clinical Practicum III 6 SH

IS 468 Clinical Seminar III 3 SH**Total 16 SH****Total = 74 SH – 6 SH (credit by ARRT RT proficiency) = 68 SH**

NOTE: All professional, leadership and clinical courses require a grade of “C” or better for the student to continue in the degree program course sequence with a major in Imaging Sciences. **Failure to complete an Imaging Sciences professional course with a letter grade of “C” or better will subject the student to review by the Committee on Progress and Promotions and may result in the student being dismissed from the program.** Students readmitted to the program at times other than the fall quarter of the second year will pick up the course sequence as prescribed by the Committee on Progress and Promotions for Imaging Sciences.

IS PROGRAM CURRICULUM FOR VASCULAR INTERVENTIONAL RADIOGRAPHY (VIR) TRACK**Fall 1 year**

IS 310 Sectional Anatomy & Pathology 5 SH

IS 314 Pathophysiology 4 SH

IS 328 Vascular Interventional Technology 6 SH**Total= 15 SH****Spring 1**

IS 318 Patient Assessment 3 SH

IS 331 Education 3 SH

IS 458 Leadership 3 SH

IS 338 Advanced Radiation Biology 3 SH**Total = 12 SH**

Summer 1

IS 447 P Clinical Practicum I 6 SH

IS 448 Clinical Seminar I 3 SH

IS 325 Pharmacology and Radiologic Contrast Agents 3 SH

Total = 12 SH

Fall 2

CHS 364 Health Care Systems and Policies 1 SH

IS 457 P Clinical Practicum II 6 SH

IS 449 Clinical Seminar II 3 SH

IS 463 Research & Statistical Methods 3 SH

Total = 13 SH

Spring 2

IS 467 P Clinical Practicum III 6 SH

IS 468 Clinical Seminar III 3 SH

IS 454 Health Care Ethics and Cultural Competence 4 SH

Total = 13 SH

Total = 65 SH

NOTE: All professional, leadership and clinical courses require a grade of “C” or better for the student to continue in the degree program course sequence with a major in Imaging Sciences. **Failure to complete an Imaging Sciences professional course with a letter grade of “C” or better will subject the student to review by the Committee on Progress and Promotions and may result in the student being dismissed from the program.** Students readmitted to the program at times other than the fall quarter of the second year will pick up the course sequence as prescribed by the Committee on Progress and Promotions for Imaging Sciences.

ENTRY LEVEL MAGNETIC RESONANCE IMAGING (MRI) CURRICULUM

The Bachelor of Science in Imaging Sciences, Magnetic Resonance Imaging (MRI) track, was designed originally to accommodate applicants licensed in Radiography or Nuclear Medicine. Since that time, there has been increased interest from unlicensed highly qualified applicants. This entry level track in Magnetic Resonance Imaging (MRI) adds three additional patient care courses to the existing MRI curriculum. These courses will serve as bridge courses to provide those students who are unlicensed in Radiography or Nuclear Medicine the academic content needed to be successful in the program.

Fall 1 year

IS 305 Introduction to Imaging Sciences 3 SH

IS 307 Introduction to Patient Care 3 SH

IS 310 Sectional Anatomy & Pathology 5 SH

IS 314 Pathophysiology 4 SH

Total 15 SH

Spring 1

IS 336 MRI Physics 5 SH

IS 318 Patient Assessment 3 SH

IS 458 Leadership 3 SH

IS 444 MRI Positioning and Protocols 4 SH

Total 15 SH

Summer 1

IS 448 P Clinical Practicum I 6 SH

IS 446 Clinical Seminar I 3 SH

IS 340 MRI Safety 3 SH

IS 325 Pharmacology and Radiologic Contrast Agents 3 SH

Total 15 SH

Fall 2

CHS 364 Health Care Systems and Policies 1 SH

IS 457 P Clinical Practicum II 6 SH

IS 449 Clinical Seminar II 3 SH

IS 463 Research & Statistical Methods 3 SH

Total 13 SH

Spring 2

IS 467 P Clinical Practicum III 6 SH

IS 468 Clinical Seminar III 3 SH

IS 454 Health Care Ethics and Cultural Competence 4 SH

IS 331 Education 3 SH

Total 16 SH

Total = 74 SH

NOTE: All professional, leadership and clinical courses require a grade of “C” or better for the student to continue in the degree program course sequence with a major in Imaging Sciences.

Failure to complete an Imaging Sciences professional course with a letter grade of “C” or better will subject the student to review by the Committee on Progress and Promotions and may result in the student being dismissed from the program. Students readmitted to the program at times other than the fall quarter of the second year will pick up the course sequence as prescribed by the Committee on Progress and Promotions for Imaging Sciences.

IMAGING SCIENCES PROGRAM: GRADUATION REQUIREMENTS

DEGREE REQUIREMENTS THAT MUST BE MET INCLUDE:

1. Satisfactory completion of all general education coursework as listed
2. Completion of each required IS professional course with a grade of “C” or better
3. Cumulative grade point average (GPA) of 2.5 or better
4. Successfully complete a comprehensive end-of-program competency assessment

IS PROGRAM CORE COURSE DESCRIPTIONS

IS 318 PATIENT ASSESSMENT (3 SEMESTER HOURS)

Patient evaluation and implementation of evidence-based care plans will be described. Evidence based practice and critical diagnostic thinking are reviewed and applied to the review of the medical record, patient interview, physical assessment, and evaluation of diagnostic studies. Assessment of oxygenation, and arterial blood gases are reviewed. Laboratory studies, imaging studies, and ECG monitoring and interpretation are discussed. Pulmonary function testing, diagnostic bronchoscopy and other diagnostic studies are also described. The student will integrate assessment findings in the development and evaluation of care plans for specific disease states and conditions. **Prerequisites: Admission to the Program**

IS 314 PATHOPHYSIOLOGY (4 SEMESTER HOURS)

This course provides an in-depth application of the concepts of pathophysiology for the assessment and management of medical imaging patients. Emphasizes the characteristic manifestations, pattern recognition, and image assessment of pathologies observed in medical images. This course investigates general pathology and organ system pathology. It includes a brief review of normal structure and function, followed by more in-depth descriptions of specific pathologic processes. Students will use textbooks and Internet resources to learn the basic characteristics, etiology, pathogenesis, clinical features, and diagnostic tools including medical imaging procedures, prognoses, and therapies for each of the specific pathologies. Students will participate in online discussions and create interactive pathology presentations in this course. **Prerequisites: Admission to the Program**

IS 310 SECTIONAL ANATOMY & PATHOLOGY (5 SEMESTER HOURS)

Radiology has been developing dramatically during the past few years. With enhancements in magnetic resonance imaging (MRI), the role of the RT has also been changing. Skills in cross-sectional anatomy are important to help the MRI technologist to identify the anatomy being imaged and to communicate effectively with the radiologist and physicians. This class will provide you with the opportunity to expand your knowledge of body cross-sectional anatomy and its appearance in CT and MRI images. This course provides an in-depth application of cross sectional anatomy for medical imaging. Emphasizes the characteristic manifestations, pattern recognition, and image assessment of pathologies observed in medical images. It includes a brief review of normal anatomy and structure, followed by general overview descriptions of specific pathologic processes. Students will use textbooks and Internet resources to learn the cross-sectional anatomy, basic characteristics, clinical features, and diagnostic tools including medical imaging procedures. **Prerequisites: Admission to the Program**

IS 325 PHARMACOLOGY AND RADIOLOGIC CONTRAST AGENTS (3 SH)

This course provides a study of pharmacodynamics, pharmacokinetics, medication administration, drug categories, and implications in patient care. Emphasizes pharmaceuticals frequently used in medical imaging. This course is intended to provide imaging sciences

professionals the knowledge in all aspects of basic pharmacology. The purpose is to educate radiologic personnel in basic pharmacology principles, ensuring quality patient care. Contrast media is used by most modalities of Diagnostic Imaging. This course is designed to provide an in-depth understanding different Contrast medias used in Diagnostic Imaging. A brief historical development and evolution of contrast media is reviewed. Topics include uses, prevention of acute reactions, contrast induced nephropathy, renal adverse reaction and more. Students will follow weekly modules and or use textbook and Internet resources to learn more about Contrast Media use, safety issues and Guideline. Students will participate online with other.

Prerequisites: Admission to the Program

IS 331 EDUCATION (3 SEMESTER HOURS)

This course will provide students with an introduction to basic principles and techniques used in Allied Health Profession education. This course will provide students with the knowledge needed by health professionals who interact with other health professionals and/or patients in educational settings including professional development, higher education, patient education or community education. Case studies will be presented. Topics include: allied health professional's role in education, patient education, course design, curriculum development, objectives and goals, lesson plan development, learning activities, use of media, teaching methods, development of presentations, testing and evaluation. **Prerequisites: Admission to the Program**

IS 463 RESEARCH & STATISTICAL METHODS (3 SEMESTER HOURS)

An introduction to the methods of scientific research to include research design and statistical analysis. Critical review of the components of research reports will be performed to include definition of the problem, review of the literature, research design, data analysis and results.

Prerequisites: Admission to the Program

IS 458 LEADERSHIP 3 SEMESTER HOURS

These special topics course is designed to provide a basic introduction to leadership by focusing on what it means *to be a good leader*. Emphasis in the course is on the *practice of leadership*. The course will examine topics such as: the nature of leadership, recognizing leadership traits, developing leadership skills, creating a vision, setting the tone, listening to out-group members, handling conflict, overcoming obstacles, and addressing ethics in leadership. Attention will be given to helping students to understand and improve their own leadership performance.

Prerequisites: Admission to the Program

IS 454 HEALTH CARE ETHICS AND CULTURAL COMPETENCE (4 SH)

This course covers ethical issues that Allied Health professionals can expect to encounter during their education and career. It covers such areas of concern as professionalism, cultural differences, confidentiality, informed consent, responsible practice, handling mistakes, difficult cases, and key legal aspects of these issues. The course will begin by helping the student understand the value of diversity in our society and allow the student to make self-examination of their own beliefs, values and biases. This will be followed by the dynamics involved when

two cultures interact. Students will examine specific cultural characteristics as they apply to health care and propose ways of adapting diversity to the delivery of health care. The course will include an in-depth assessment of the Culturally and Linguistically Appropriate Services [CLAS] standards and cultural competency information available to healthcare organizations.

Prerequisites: Admission to the Program

IS 448 CLINICAL SEMINAR I (3 SEMESTER HOURS)

This course builds on the previous learning related to imaging sciences. This course will allow the students to engage in self-directed study to prepare for the American Registry of Radiologic Technologist (ARRT) by completing registry review board modules. This course will provide the students the opportunity to integrate the theory and clinical practice in order to meet the complex needs of patients. ARRT registry review modules and case presentations will be completed. This course will provide a review of medical imaging with an emphasis on problem solving and critical thinking in the imaging track selected. The course is intended for senior students to prepare for the ARRT's credentialing exam. **Prerequisites: Admission to the Program**

IS 449 CLINICAL SEMINAR II (3 SEMESTER HOURS)

This course builds on the previous learning related to imaging sciences. This course will allow the students to engage in self-directed study to prepare for the American Registry of Radiologic Technologist (ARRT) by completing registry review board modules. This course will provide the students the opportunity to integrate the theory and clinical practice in order to meet the complex needs of patients. ARRT registry review modules and case presentations will be completed. This course will provide a review of medical imaging with an emphasis on problem solving and critical thinking in the imaging track selected. The course is intended for senior students to prepare for the ARRT's credentialing exam. **Prerequisites: Admission to the Program and IS 446 – CLINICAL SEMINAR I**

IS 468 CLINICAL SEMINAR III (3 SEMESTER HOURS)

This course builds on the previous learning related to imaging sciences. This course will allow the students to engage in self-directed study to prepare for the American Registry of Radiologic Technologist (ARRT) by completing registry review board modules. This course will provide the students the opportunity to integrate the theory and clinical practice in order to meet the complex needs of patients. ARRT registry review modules and case presentations will be completed. This course will provide a review of medical imaging with an emphasis on problem solving and critical thinking in the imaging track selected. The course is intended for senior students to prepare for the ARRT's credentialing exam. **Prerequisites: Admission to the Program and IS 456 – CLINICAL SEMINAR II**

IS 447 P CLINICAL PRACTICUM I (6 SEMESTER HOURS)

Supervised clinical experience in the imaging track selected. This course is designed so the students gains the clinical experience needed to function in an active imaging sciences department and to document the needed clinical procedures. Review of medical imaging with an

emphasis on problem solving and critical thinking in the imaging track selected. **Prerequisites: Admission to the Program**

IS 457 P CLINICAL PRACTICUM II (6 SEMESTER HOURS)

Supervised clinical experience in the imaging track selected. This course is designed so the student gains the clinical experience needed to function in an active imaging sciences department and to document the needed clinical procedures. Each clinical practicum requires 333.33 hours in an assigned facility for supervised practice of acquired knowledge and skills. This course will offer a review of medical imaging with an emphasis on problem solving and critical thinking in the imaging track selected. **Prerequisites: Admission to the Program and IS 445 P – CLINICAL PRACTICUM I**

IS 467 P CLINICAL PRACTICUM III (6 SEMESTER HOURS)

Supervised clinical experience in the imaging track selected. This course is designed so the students gains the clinical experience needed to function in an active imaging sciences department and to document the needed clinical procedures. Each of the three clinical practicums will consist of 333.33 hours (total of 1000 hours) in an assigned facility for supervised practice of acquired knowledge and skills. Review of medical imaging with an emphasis on problem solving and critical thinking in the imaging track selected. **Prerequisites: Admission to the Program and IS 455 P – CLINICAL PRACTICUM II**

IS 481 P CLINICAL SPECIALTY PRACTICUM (6 SEMESTER HOURS)

COURSE DESCRIPTION

Supervised clinical experience in the imaging track selected. This course is designed so the students gains additional clinical experience needed to competently function in an active imaging sciences department and to document the additional required clinical procedures in an assigned facility for supervised practice of acquired knowledge and skills. Review of medical imaging with an emphasis on problem solving and critical thinking in the imaging track selected. **Prerequisites: Admission to the Program and IS 465 P – CLINICAL PRACTICUM III**

COMPUTED TOMOGRAPHY (CT) TRACK

IS 337 COMPUTED TOMOGRAPHY PHYSICS (3 SEMESTER HOURS)

This course will provide the student with an in-depth review of the fundamental physical principles of Computed Tomography (CT). CT is a specialized imaging modality. The historical development and evolution of CT will be reviewed. Physics topics include x-radiation in forming the CT image, CT beam attenuation, linear attenuation coefficients, tissue characteristics and Hounsfield number application. Data acquisition and manipulation techniques, image reconstruction algorithms will be also explained. This course will also provide students with knowledge of quality control, and instrumentational concepts. **Prerequisites: Admission to the Program**

IS 453 COMPUTED TOMOGRAPHY POSITIONING & PROTOCOLS (3 SH)

Computed Tomography (CT) is a specialized imaging modality. This course is designed to provide an understanding of proper protocols and positioning utilized to acquire appropriate imaging with patient history in mind concepts of Computed Tomography. Anatomy and Pathophysiology is reviewed for appropriate protocol and contrast usage. Protocol and Positioning topics include basic overview of CT Physics, Patient communication and safety, Radiation dose, indications for procedure, preparation, orientation of CT room, positioning and landmarks, patient history and assessment, types of contrast media and their usage, scan parameters. Imaging protocols for Brain, Chest, abdomen, Spine and Musculo-skeletal imaging will be covered in this course. CT protocols vary from site to site and most often are dependent on radiologist's preference. **Prerequisites: Admission to the Program**

IS 338 ADVANCED RADIATION BIOLOGY (3 SEMESTER HOURS)

This course is directed to Computed Tomography (CT) and Interventional Radiography students enrolled in the Imaging Sciences program. Content will include review and continuation of basic radiobiology involved with radiography and advanced modalities. It will address the radiobiological/biophysical events at the cellular and subcellular levels. Analysis of factors influencing radiation response of cells and tissues will be covered. Construction and evaluation of radiobiological data on graphs, charts, and survival curves will be included. Relationships of time, dose, fractionation, volume and site as they apply to tissue response will be evaluated. The principles of radiation response modifiers, hyperthermia, chemotherapy and their influence on biologic effects in combination with radiation will be examined. **Prerequisites: Admission to the Program**

MAGNETIC RESONANCE IMAGING (MRI) TRACK

IS 336 MRI PHYSICS (5 SEMESTER HOURS)

This course will provide the student with an introduction to the field of MRI. Topics will include an overview of MRI history and development, fundamental principles of Magnetism, Safety in MRI, equipment, terminology, and coils. This course will explain in depth concepts of MRI physics. Topics will include, Basic Principles of MRI, Image weighting and contrast, tissue characteristics, signal production, image formation, image acquisition & image production, pulse sequences, flow phenomena, artifacts in MRI, scanning parameters, Contrast media administration, along with Functional Imaging techniques. **Prerequisites: Admission to the Program**

IS 444 MRI POSITIONING AND PROTOCOLS (4 SEMESTER HOURS)

Magnetic Resonance Imaging (MRI) is a specialized imaging modality. This course is designed to provide an understanding of proper protocols and positioning utilized to acquire appropriate imaging with patient history in mind concepts of Magnetic Resonance Imaging. Anatomy and Pathophysiology is reviewed for appropriate protocol and contrast usage. Protocol and Positioning topics include basic overview of MRI Physics, indications for procedure,

preparation, orientation of MRI room, positioning and landmarks, patient history and assessment, types of contrast media and their usage, scan parameters for brain, spine, , upper and lower extremity imaging, Female and Male pelvis, Abdominal imaging, Cardiac and Breast imaging. MRI protocols vary from site to site and most often are dependent on radiologist's preference. Students will follow weekly modules and or use textbook and Internet resources to learn MRI protocols and positioning. **Prerequisites: Admission to the Program**

IS 340 MRI SAFETY (3 SH)

This course provides an in-depth application of the health and safety concerns of MRI technology. Both theoretical and practical information will be covered. MRI physics bioeffects of static, gradient, and radiofrequency electromagnetic fields will be covered as well as the risks associated with acoustic noise. Use of MRI during pregnancy, the design of an MRI facility to support safety, the procedures to screen patients and other individuals, and the management of patients with claustrophobia, anxiety, or emotional distress will be addressed. Review of the safety of MRI contrast agents, use of ferromagnetic detection systems, techniques for physiological monitoring, unique safety needs of interventional MRI centers, and administration of sedation and anesthesia during MRI will be covered. Proper management of patients with metallic implants and complex electronically activated devices, such as cardiac pacemakers and neuromodulation systems will be covered. MRI safety policies and procedures will be reviewed for hospitals/medical centers, outpatient facilities, children's hospitals, and research facilities. Finally, MRI standards and guidelines will be addressed for the United States.

ENTRY LEVEL MAGNETIC RESONANCE IMAGING (MRI) TRACK

IS 305 INTRODUCTION TO IMAGING SCIENCES (3 SEMESTER HOURS)

This course focuses on specialized imaging sciences modalities. It includes concepts and theories of equipment operations and their integration for medical diagnosis. The student will be introduced to the basics of the available advanced imaging modalities used in the assessment of anatomy and diagnosis of disease processes. This course will provide instruction in the Imaging Sciences Program curricula to meet the needs of students for entry level employment by providing an overview diagnostic imaging, the technological education and clinical practice. The student will be introduced to the basics of advanced imaging modalities used in the assessment of anatomy and diagnosis of disease processes. **Prerequisites: Admission to the Program**

IS 307 INTRODUCTION TO PATIENT CARE (3 SEMESTER HOURS)

An overview of the historical development of radiography, and basic radiation protection. An introduction to the many facets of allied health professions; including types of health care professionals, medical ethics, medical terminology, patient assessment, infection control procedures, emergency and safety procedures, communication and patient interaction skills, promoting a safe clinical environment and basic pharmacology. Topics also include patient's right to privacy, confidentiality, documentation, team building, cultural issues, age related concerns, and death and dying. This course is intended to assist students in the understanding of

the environment encountered in clinical agencies. This course infers from evidence-based medicine to promote the application of critical thinking skills and clinical judgment. **Prerequisites: Admission to the Program**

IS 336 MRI PHYSICS (5 SEMESTER HOURS)

This course will provide the student with an introduction to the field of MRI. Topics will include an overview of MRI history and development, fundamental principles of Magnetism, Safety in MRI, equipment, terminology, and coils. This course will explain in depth concepts of MRI physics. Topics will include, Basic Principles of MRI, Image weighting and contrast, tissue characteristics, signal production, image formation, image acquisition & image production, pulse sequences, flow phenomena, artifacts in MRI, scanning parameters, Contrast media administration, along with Functional Imaging techniques. **Prerequisites: Admission to the Program**

IS 444 MRI POSITIONING AND PROTOCOLS (4 SEMESTER HOURS)

Magnetic Resonance Imaging (MRI) is a specialized imaging modality. This course is designed to provide an understanding of proper protocols and positioning utilized to acquire appropriate imaging with patient history in mind concepts of Magnetic Resonance Imaging. Anatomy and Pathophysiology is reviewed for appropriate protocol and contrast usage. Protocol and Positioning topics include basic overview of MRI Physics, indications for procedure, preparation, orientation of MRI room, positioning and landmarks, patient history and assessment, types of contrast media and their usage, scan parameters for brain, spine, , upper and lower extremity imaging, Female and Male pelvis, Abdominal imaging, Cardiac and Breast imaging. MRI protocols vary from site to site and most often are dependent on radiologist's preference. Students will follow weekly modules and or use textbook and Internet resources to learn MRI protocols and positioning. **Prerequisites: Admission to the Program**

IS 340 MRI SAFETY (3 SH)

This course provides an in-depth application of the health and safety concerns of MRI technology. Both theoretical and practical information will be covered. MRI physics bioeffects of static, gradient, and radiofrequency electromagnetic fields will be covered as well as the risks associated with acoustic noise. Use of MRI during pregnancy, the design of an MRI facility to support safety, the procedures to screen patients and other individuals, and the management of patients with claustrophobia, anxiety, or emotional distress will be addressed. Review of the safety of MRI contrast agents, use of ferromagnetic detection systems, techniques for physiological monitoring, unique safety needs of interventional MRI centers, and administration of sedation and anesthesia during MRI will be covered. Proper management of patients with metallic implants and complex electronically activated devices, such as cardiac pacemakers and neuromodulation systems will be covered. MRI safety policies and procedures will be reviewed for hospitals/medical centers, outpatient facilities, children's hospitals, and research facilities. Finally, MRI standards and guidelines will be addressed for the United States.

VASCULAR INTERVENTIONAL RADIOGRAPHY (VIR) TRACK

IS 328 VASCULAR-INTERVENTIONAL TECHNOLOGY (6 SEMESTER HOURS)

This didactic course includes instruction over: procedural angiography including; imaging of the heart, pulmonary vascular system, thoracic aorta, central venous access procedures, cardiac-interventional, vascular-interventional, and nonvascular interventional procedures. Each student will be working in either Vascular-Interventional Radiology or Interventional Cardiology. The course encourages students to combine theoretical knowledge with the practical experience they acquire while working in these clinical areas. Learning activities for this course review and build upon pre-existing knowledge, such as human anatomy, physiology, pathology, patient care in radiography, and radiation protection. **Prerequisites: Admission to the Program**

IS 338 ADVANCED RADIATION BIOLOGY (3 SEMESTER HOURS)

This course is directed to Computed Tomography and Interventional Radiography students enrolled in the IS Program. Content will include review and continuation of basic radiobiology involved with radiography and advanced modalities. Radiobiological and biophysical events at the cellular and subcellular levels will be addressed. Analysis of factors influencing radiation response of cells and tissues will be covered. Construction and evaluation of radiobiological data on graphs, charts, and survival curves will be included. Relationships of time, dose, fractionation, volume and site as they apply to tissue response will be evaluated. Principles of radiation response modifiers, hyperthermia, chemotherapy and their influence on biologic effects in combination with radiation will be examined. **Prerequisites: Admission to the Program**



RUSH UNIVERSITY
COLLEGE OF HEALTH SCIENCES

Rush University Honor Code

In the accordance with the Department of Imaging Sciences 2017-2018 Handbook, I pledge that my academic, research, and/or clinical work will be of the highest integrity. I shall neither give nor receive unauthorized aid; I shall not represent the work of others as my own; I shall not engage in scientific misconduct; and I shall treat all persons with the greatest respect and dignity, just as the ethical codes of Rush University Medical Center and my future profession demand. I recognize that behaviors that impede learning or undermine academic, research, and clinical evaluation, including but not limited to falsification, fabrication, and plagiarism, are inconsistent with Rush University values and must be reported.

Implementation of the Honor Code

This Honor Code (hereafter referred to as the Code) sets the standards for expected professional behavior within the University and the Medical Center. Commitment to this Code is a shared responsibility of all faculty, staff, and students within Rush University community to ensure the highest standards of behavior, whether in the classroom, the laboratory, or in the clinical setting, and to ensure that education obtained at Rush provides a sound foundation for each student's future success as an academic, scientific, or healthcare professional.

Code Enforcement

Any violations of this Code or suspicion of student or academic misconduct should be reported to the student's college for further review in accordance with the procedures specified by that college. Each college will be expected to set standards for addressing Honor Code violations and cases of misconduct in a fair and consistent manner that best fits their respective student population. Students refusing to sign must submit a letter to their dean's office explaining why, and adherence to the Code is required for matriculation, whether or not the document has been signed. The Code may also be enforced for off-campus actions when the student is representing themselves as a member of the University.

Commitment

By signing below, I affirm my commitment to this Code and pledge to act with integrity and adhere to the Rush University values of Innovation, Collaboration, Accountability, Respect, and Excellence. I understand that this signed document becomes part of my permanent record, and I must uphold the letter and spirit of this Code throughout my Rush education. I verify receipt of the program handbook and pledge to refer to this handbook for program policies and procedures.

Student Signature

Date

Printed Name