Radiologic Sciences

These professionals function as first assistants to the physician in medical practice, utilizing radiant energy, ionizing radiation (X-Ray), other forms of electro-magnetic energy, and sound waves for the imaging, diagnosis, and treatment of disease. Each distinct specialty option has its own educational criteria, accreditation and clinical training requirements.

The program prepares technologists for entry-level positions and also prepares the technologist who wishes to gain additional expertise. The radiologic technology curriculum and all program options are designed to meet the guidelines for accreditation and/or recognition by the American Registry of Radiologic Technologists, the Joint Review Committee on Education in Radiation Therapy Technology and the American Registry of Diagnostic Medical Sonography.

The Radiologic Sciences program offers a Bachelor of Science Degree with options in: diagnostic medical sonography, magnetic resonance imaging/computed tomography, radiation therapy technology, and radiology education/management.

To be considered for enrollment into the Radiologic Sciences program, prospective students must first obtain admission to the University. To be approved for entry into the major and professional sequences, applicants must submit additional application materials. This program admits a limited number of students based on specific selection criteria. Students may be selected for admission to the Radiologic Sciences program either as freshmen or sophomores. Freshmen will be evaluated on the basis of ACT scores and high school grade point average. Sophomores will be evaluated on the number of hours of college credit, college grade point average as calculated by SIUC, college mathematics and science grades and the grade in anatomy. Anatomy, math and science courses must be completed prior to the following fall semester.

Accreditation guidelines place limits on the enrollment in this program. Students begin the professional sequence each fall only. This degree program requires the successful completion of clinical internships. In accordance with Federal and State guidelines, the clinical sites will require proof of the following: vaccination for measles, mumps, rubella, tetanus, TB, varicella (chicken pox), Hepatitis B, and influenza; current CPR card; and proof of completion of HIPAA and blood-borne pathogens training. Affiliation sites will also require students to undergo a criminal background check and drug screening.

Associate in Applied Science in Radiological Sciences Degree

The A.A.S. degree in the Radiologic Sciences curriculum is designed to prepare students to become registered radiologic technologists (medical radiographers). Completion of the program provides graduates with the educational requirements necessary to take the national certification examination administered by the American Registry of Radiologic Technologists. Students in the radiation therapy technology, and magnetic resonance imaging/computed tomography, and radiology education, and radiology management specialization will receive the A.A.S. degree upon successful completion of their junior year.

All students graduating from the Radiography program must pass their ARRT exam and be certified by the ARRT by the start date of their specialization or the student will not be allowed to enter their specialization in Radiation Therapy or MRI/CT. All Radiography students must pass each of their Radiologic Science courses: RAD 122, 102, 112, 112L, 202, 212, 222, 232, 232L, 312, 322, 332, 342, 352 with a grade of "C" or better (the minimum requirement) in order to satisfy Program requirements and
stay in the Program. Any Radiography student that does not meet the minimum course requirement (a
course grade of "C" or better) will not be allowed to continue in the Program. The student is allowed to re-
apply for admission to the Program the following year through the Program's online application process.
The following general education and radiologic sciences courses totaling 70 credit hours are required to
receive the A.A.S. degree in Radiologic Sciences.

### Associate in Applied Science (AAS) Radiological Sciences Degree Requirements

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core Curriculum Requirement</td>
<td>15</td>
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<tr>
<td>General Education Courses: ENGL 101; MATH 108 OR 101; CMST 101; University Core Science,</td>
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</tr>
<tr>
<td>University Core Social Science.</td>
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<tr>
<td>A.A.S. Radiologic Sciences Requirements</td>
<td>48</td>
</tr>
<tr>
<td>Radiologic Sciences Courses: RAD 122, RAD 102, RAD 112L, RAD 202, RAD 212, RAD 222, RAD 232, RAD 232L, RAD 312, RAD 322, RAD 332, RAD 342, RAD 352</td>
<td></td>
</tr>
<tr>
<td>Additional Required Course: AH 241 or Anatomy Equivalent</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
</tr>
</tbody>
</table>

### Bachelor of Science (BS) Radiologic Sciences Degree

The Bachelor of Science degree in Radiologic Sciences is a 120-semester hour program consisting of forty-one semester hours of University Core Curriculum requirements, and 79 semester hours of combined radiography and professional option courses. All coursework required for the A.A.S. degree in Radiologic Sciences counts toward this degree. Within the Radiologic Sciences curriculum, certain courses must be passed by a minimum requirement in order to progress through the program (please see course descriptions for minimum requirements listed for each course). Any student unable to achieve the minimum requirements, will not be allowed to progress through the program and must re-apply for admission into the program and specialization through the program's online application process.

### Diagnostic Medical Sonography (Ultrasound) Option

Sonography is a diagnostic medical procedure that uses high frequency sound waves (ultrasound) to produce dynamic visual images of organs, tissues, or blood flow inside the body. This type of procedure is called a sonogram. There are several areas of specialization in the field of Sonography. While most Sonographers work in hospitals, many will also find employment in clinics, private practice physician offices, public health facilities, laboratories, and other medical settings performing examinations in their areas of specialization. Career advancement opportunities exist in education, administration, research, and in commercial sales and education/application specialists.

The sonography option is a direct entry program for students with the anticipated graduation year of 2018 or later as students are not required to go through the Diagnostic Radiography portion of the program. If an AAS Radiology graduate wants to pursue Sonography education, they will have to complete the third and fourth year Sonography coursework as well as all general education courses listed in the curricular guide.
Students who are accepted into the Sonography program as a freshman or a sophomore will receive a minor in Health Information and Informatics Management and a minor in Health Care Management by completion of the additional requirements. Year three transfer students or students who are accepted into the Sonography program as a Junior may do one or both of the minors. Some of the additional requirements may be substituted for those newly transfer or newly accepted Junior students.

Within the Diagnostic Medical Sonography Program, each student must complete RAD 349, 359A, 359B, 369, 379A, 379B, 389, 399A, 399B, 399C, 459A, 459B, 479A, 479B, and 489 with a grade of "C" or higher and RAD 409A and 409B with a grade of "B" or higher. Any student not completing the above mentioned requirements will not be allowed to graduate/progress through the Sonography Program and must re-apply for admission into the program through the program's online application process.

### Diagnostic Medical Sonography Specialization Degree Requirements

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>University Core Curriculum Requirement</td>
<td>39</td>
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<tr>
<td>To include: UNIV 101, MATH 101 or MATH 108, PHYS 101</td>
<td></td>
</tr>
<tr>
<td>Sonography Requirements</td>
<td>54</td>
</tr>
<tr>
<td>Additional Requirements</td>
<td>8</td>
</tr>
<tr>
<td>AH 241 - 4 (2 credits will cover UCC Human Health)</td>
<td>2</td>
</tr>
<tr>
<td>AH 415</td>
<td>3</td>
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<tr>
<td>AH 105</td>
<td>2</td>
</tr>
<tr>
<td>HCM 310</td>
<td>3</td>
</tr>
<tr>
<td>HCM COURSE - Receive Health Care Management Minor and Health Information and Informatics Management Minor</td>
<td>21</td>
</tr>
<tr>
<td>HCM 360</td>
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<td>HCM 364</td>
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<td>HCM 366</td>
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<td>HCM 368</td>
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<tr>
<td>HCM 388</td>
<td>3</td>
</tr>
<tr>
<td>HCM 410</td>
<td>3</td>
</tr>
</tbody>
</table>
**Magnetic Resonance Imaging/Computed Tomography Option**

This option is designed to prepare technologists in the advanced areas of magnetic resonance imaging (MRI) and computed tomography (CT). The MRI and CT components will emphasize physics, technology, instrumentation, sectional anatomy, and pathology. Technologists employed in these capacities will be supervised by a board certified radiologist, but will be afforded a greater amount of responsibility and independence in the performance of their duties.

**Magnetic Resonance Imaging/Computed Tomography Specialization Degree Requirements**

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core Curriculum Requirement</td>
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<tr>
<td>To include: UNIV 101U, AH 241 or Anatomy Equivalent AH 105</td>
<td>2</td>
</tr>
<tr>
<td>Professional Core Requirements</td>
<td>48</td>
</tr>
<tr>
<td>Including: RAD 102, RAD 112, RAD 112L, RAD 122, RAD 202, RAD 212, RAD 222, RAD 232, RAD 232L, RAD 312, RAD 322, RAD 332, RAD 342, RAD 352</td>
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</tr>
<tr>
<td>MRI and CT</td>
<td>31</td>
</tr>
<tr>
<td>Including: RAD 364, RAD 374, RAD 384, RAD 394, RAD 404, RAD 414, RAD 424, RAD 434</td>
<td></td>
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<tr>
<td>Total</td>
<td>120</td>
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</tbody>
</table>

**Radiation Therapy Technology Option**

Radiation therapy technologists assist radiation oncologists in all aspects of the administration of radiation therapy treatment; their primary responsibility consists of exposing specific areas of the patient’s body to prescribed doses of ionizing radiation. Radiation therapy technologists also provide appropriate patient care; this includes exercising judgment when administering treatment and adhering to the principle of radiation protection for the patient, self and others.

Within the radiation therapy specialization, each student must complete RAD 360, 370, 380, 390 and 400 with a "C" or higher and RAD 410, 420, 430, and 440 with a "B" or higher. Any student not completing the above mentioned requirements, will not be allowed to graduate with the radiation therapy specialization and must re-apply for admission into the specialization. The student will also not be cleared to take the ARRT radiation therapy examination if they do not meet the minimum criteria through the program's online application process.
Radiation Therapy Technology Specialization Degree Requirements

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core Curriculum Requirement</td>
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<tr>
<td>To include: UNIV 101U, AH 241 or Anatomy Equivalent AH 105</td>
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<tr>
<td>Radiation Therapy Technology Core Requirements</td>
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<tr>
<td>Including: RAD 102, RAD 112, RAD 112L, RAD 122, RAD 202, RAD 212, RAD 222, RAD 232, RAD 232L, RAD 312, RAD 322, RAD 332, RAD 342, RAD 352</td>
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<tr>
<td>Radiation Therapy Technology</td>
<td>31</td>
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<tr>
<td>Including: RAD 360, RAD 370, RAD 380, RAD 390, RAD 400, RAD 410, RAD 420, RAD 430, RAD 440</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

Radiology Education/Management Online

This option is designed to allow entry level radiographers the opportunity to study educational theories, philosophies, styles, and techniques. Additionally, the student will be introduced to management concepts as they relate to medical imaging departments. The primary focus of the radiology education and management option is to allow students who wish to enter either radiography education or radiography management the opportunity to learn and develop the skills necessary for success in these two environments. Students will be required to complete an internship in their chosen area of emphasis (if state licensure is feasible) or an undergraduate research project related to radiology education or management.

Radiology Education/Management Specialization Degree Requirements

<table>
<thead>
<tr>
<th>Degree Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core Curriculum Requirement</td>
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</tr>
<tr>
<td>To include: UNIV 101U, AH 241 or Anatomy Equivalent AH 105</td>
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<tr>
<td>Radiology Education/Management Core Requirements</td>
<td>48</td>
</tr>
<tr>
<td>Including: RAD 102, RAD 112, RAD 112L, RAD 122, RAD 202, RAD 212, RAD 222, RAD 232, RAD 232L, RAD 312, RAD 322, RAD 332, RAD 342, RAD 352</td>
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<td>Radiology Education /Management</td>
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Degree Requirements

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<tr>
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<tbody>
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<td>RAD 345, RAD 355, RAD 415, RAD 425A, RAD 425B, RAD 435, RAD 480, RAD 481, RAD 482</td>
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</table>

<table>
<thead>
<tr>
<th>Select One Course:</th>
<th>4</th>
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<tbody>
<tr>
<td>RAD 475 or RAD 476</td>
<td></td>
</tr>
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</table>

Total 120

Radiologic Sciences Courses

RAD102 - Radiographic Technique 102-3 Introduction to Radiologic Technology and Radiographic Technique. This course is designed to introduce the student to the medical radiography profession. Students will begin their study of medical terminology, professional behavior, ethics, theory of radiographic exposure and its application to computed radiography and digital radiography. Included is an introduction to the principles of radiation protection. Restricted to RADS majors.

RAD112 - Anatomy and Positioning 112-3 Radiographic Anatomy and Positioning. Designed to provide the student radiographer with didactic instruction leading to the development of clinical competencies. It serves as a foundation for the progression towards advanced clinical knowledge. Radiographic anatomy and positioning of the extremities, chest, abdomen, vertebral column, and routine fluoroscopic procedures will be stressed. Also, emphasis is placed on the soft-tissue structures demonstrated by radiographs of these areas. The principles of radiation protection for the patient and for the radiographer are stressed. Routine radiographic positioning common to most health facilities will be described. Must be taken concurrently with RAD 112L. If RAD 112L is dropped, then RAD 112 must be dropped. Prerequisites: AH 241 with a grade of C or better. Co-requisites: RAD 112L, RAD 102 and RAD 202. Restricted to RADS majors.

RAD112L - Anatomy-Positioning Lab 112L-1 Radiographic Anatomy and Positioning Laboratory. This course is the laboratory to accompany RAD 112. Designed to provide the student radiographer with didactic instruction leading to the development of clinical competencies. It serves as a foundation for the progression towards advanced clinical skills. Radiographic anatomy and positioning of the extremities, chest, abdomen, vertebral column, and routine fluoroscopic procedures will be stressed. The principles of radiation protection for the patient and for the radiographer are practiced as well. Routine radiographic positioning common to most health facilities will be described, demonstrated and practiced on phantoms in the energized X-ray labs. Two laboratory sessions per week. Must be taken concurrently with RAD 112. If RAD 112 is dropped, then RAD 112L must be dropped. Prerequisite: AH 241 with a grade of C or better. Co-requisites: RAD 112, RAD 102 and RAD 202. Restricted to RADS majors. Lab fee: $75.

RAD122 - Seminar in Rad Sciences 122-2 Seminar in Radiologic Sciences. Study will focus on developing a professional identity, an understanding of the integrated health care team, an understanding of the language of medicine in general and radiology in particular, and development of basic patient care techniques and skills. Restricted to admission to major or consent of school.

RAD202 - Radiographic Physics 202-3 Radiographic Physics. This course will concentrate on general theories of physics as they relate to matter, mechanics and electricity. It also involves the study of the nature and production of radiation and understanding of the complexity of radiographic equipment and x-ray circuitry. Co-requisites: RAD 102, RAD 112 and RAD 112L. Restricted to RADS majors and acceptance into the Radiologic Sciences Program.
RAD212 - Special Procedures 212-2 Special Radiographic Procedures. Includes the study of contrast producing agents which are used to visualize specific parts of the body. Radiographic technique employed in this type of imaging is highly specialized and will be studied in depth. Prerequisite: RAD 222 with a minimum grade of C. Co-requisites: RAD 232 and RAD 232L.

RAD222 - Radiography Clinic I 222-9 Radiography Clinic I. The student is assigned to a selected clinical education center for the entire semester. During this semester, the student radiographer is expected to practice and perfect the professional skills developed the previous semester on campus. The student will participate in specific experiences and film critique assignments designed to meet objectives for the semester. Prerequisites: C or better in RAD 102, RAD 112, RAD 112L and RAD 202. Restricted to RADS majors.

RAD232 - Selected Systems 232-3 Selected Radiography Systems. This course is designed to instruct the student in the anatomy of the skull, facial bones, paranasal sinuses, mandible, digestive system, urinary system, biliary system, and human reproductive systems. Routine imaging protocols common to most health facilities will be described. Particular emphasis will be placed on radiographic imaging of the trauma patient. This course must be taken concurrently with RAD 232L. If RAD 232 is dropped then RAD 232L must be dropped. Prerequisite: C or better in RAD 222. Co-requisites: RAD 232L and RAD 212. Restricted to RADS majors.

RAD232L - Selected Systems Lab 232L-1 Selected Radiography Systems Laboratory. This is the laboratory component associated with RAD 232. Designed to instruct the student in the anatomy and positioning of the skull, facial bones, paranasal sinuses, digestive, urinary, biliary and human reproductive systems. Routine imaging projections common to most health facilities will be practiced on a phantom in the energized laboratory. Particular emphasis is placed on radiography of the trauma patient. Principles of radiation protection for the patient and the radiographer are practiced as well. One laboratory session per week. Must be taken concurrently with RAD 232. If RAD 232 is dropped then RAD 232L must be dropped. Prerequisite: RAD 222 with a minimum grade of C. Co-requisites: RAD 232 and RAD 212. Restricted to RADS majors. Lab fee: $75.

RAD299 - Individual Study 299-1 to 16 Individual Study. Provides students with opportunity to develop a special program of studies to fit a particular need not met by other offerings. Enrollment provides access for advanced radiologic sciences students to the resources of the radiologic sciences facilities. Each student will work under the supervision of a sponsoring program faculty member. Restricted to RADS majors.

RAD312 - Radiographic Pathology 312-3 Radiographic Pathology. Deals with the etiology and processes of trauma and disease. Emphasis will be placed on radiographic pathology of the body systems and the manifestation of this pathology. Prerequisite: RAD 332 with a minimum grade of C. Co-requisites: RAD 322, RAD 342 and RAD 352.

RAD322 - Rad Contrast-Sectional Anat 322-3 Radiographic Contrast and Sectional Anatomy. An introduction to the use of radiopharmaceuticals for enhancement of various anatomical structures within the human body. Includes coverage of common types of contrast agents, their administration, their physiological effects on various organ systems, and emergent treatment. Sectional anatomy includes the study of body structures in the coronal, sagittal and transverse planes, used in computed tomography (CT) and magnetic resonance imaging (MRI). Emphasis will be placed on 1) identifying the imaging plane; 2) identifying the anatomy visualized in a given plane; and 3) differentiating between images produced by CT and MRI. Prerequisite: RAD 332 with a minimum grade of C. Co-Requisites: RAD 312, RAD 342 and RAD 352.

RAD332 - Radiography Clinic II 332-9 Radiography Clinic II. The student returns to a clinical education center for the entire semester. The student radiographer will practice and perfect the advanced professional skills developed in the previous semester on campus. The student will participate in specific experiences and film critique assignments designed to meet the objectives for the semester, including advanced modalities. Prerequisite: C or better in RAD 212, RAD 232 and RAD 232L. Restricted to RADS majors.

RAD341 - Sonography Fundamentals 341-1 Fundamentals of Sonography. This course is designed to introduce the profession of Diagnostic Medical Ultrasonography. Topics of study include historical
perspectives, patient care and communication, medical ethics and terminology. Restricted to RADS majors.

**RAD342 - Radiation Biology** 342-3 Radiation Biology. Designed to instruct the student radiographer in the principles and terminology of radiobiology. Emphasis will be placed on how these principles relate to radiation protection for both the patient and radiographer. Also included are introductions to nuclear medicine and radiation therapy technology. Prerequisite: RAD 332 with a minimum grade of C. Co-Prerequisites: RAD 312, RAD 322 and RAD 352.

**RAD345 - Intro to Rad Management** 345-3 Introduction to Radiology and Diagnostic Imaging Management. (Same as DH 345) This course focuses on the unique management issues involved in diagnostic imaging. These problems include accreditation, federal law unique to radiology, and medical-legal issues of patient care. Additionally, state and local licensure laws pertinent to ionizing radiation and radiation safety will be explored. Restricted to the major or consent of school.

**RAD349 - Sonography Fundamentals** 349-3 Fundamentals of Sonography. This course is designed to introduce the profession of Diagnostic Medical Ultrasonography. Topics of study include historical perspectives; medical ethics and law; patient care and communication; exam related documentation; work related musculoskeletal disorders, and terminology. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD349B - Fundamentals of Sonography** 349B-1 Fundamentals of Sonography. This course is designed to introduce the profession of Diagnostic Medical Ultrasonography. Topics of study include historical perspectives, medical ethics and law; patient care and communication; exam related documentation; work related musculoskeletal disorders, and terminology. Restricted to major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD352 - Special Imaging Modalities** 352-3 Special Imaging Modalities. This course provides the student with the knowledge and understanding relevant to the function, operation and application of the various techniques used in image production. This course also includes a complete review of the radiography curriculum in preparation for the American Registry of Radiologic Technologists National certification examination. Prerequisite: RAD 332 with a minimum grade of C. Co-Requisites: RAD 312, RAD 322 and RAD 342.

**RAD355 - Teaching Strategies Radiology** 355-3 Teaching Strategies in Radiology. (Same as DH 365) This course is designed to introduce the prospective radiology educator to philosophies and strategies required to successfully instruct students in the various fields of allied health, including radiography. Restricted to the major or consent of school.

**RAD359A - OB/GYN Sonography I** 359A-3 Obstetric & Gynecology Sonography I. A study of gynecologic and obstetric/fetal anatomy; physiology; patient care; and imaging/interventional techniques. Emphasis will be placed on normal and abnormal gynecologic anatomy, normal and abnormal first trimester obstetric ultrasound, physiology, sonographic patterns, clinical history, physical assessment, and appropriate exam protocol. Restricted to major in RADS or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD359B - OB/GYN Sonography II** 359B-3 Obstetric & Gynecology Sonography II. A study of gynecologic and obstetric/fetal anatomy; physiology; patient care; and imaging/interventional techniques. Emphasis will be placed on normal and abnormal obstetric and fetal anatomy, physiology, sonographic patterns, clinical history, physical assessment. Prerequisite: RAD 359A with a minimum grade of C. Concurrent enrollment in RAD 379B required. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD359C - Ob & Gyn Sonography II** 359C-3 Ob & Gyn Sonography II. A study of gynecologic and obstetric/fetal anatomy; physiology; patient care; and imaging/interventional techniques. Emphasis will be placed on normal and abnormal obstetric and fetal anatomy, physiology, sonographic patterns, clinical history, physical assessment. Prerequisite: RAD 359A with a minimum grade of C. Restricted to major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.
RAD360 - Fundamentals of Radiation Therapy 360-2 Fundamentals of Radiation Therapy. The rationale for and methods employed in the treatment of cancer by radiotherapy. The role of radiotherapy and its relationship to other modalities utilized in the treatment of cancer are explored and defined. Also, an introduction to the principles and concepts of radiobiology. Restricted to RADS majors.

RAD364 - CT Technology 364-3 Computed Tomography Technology. This course will focus on the physical principles of computed tomography. Topics of discussion will include the history of computed tomography, its instrumentation, data acquisition, image reconstruction, contrast agents, patient care/safety, and quality assurance. Special imaging application for interventional, trauma, and oncology will be discussed. Restricted to major, completion of ARRT in radiography, or consent of school.

RAD369 - Vascular Sonography 369-3 Vascular Sonography. A study of vascular anatomy, physiology, hemodynamics, wave form analysis, and treatment of vascular disease. Emphasis will be placed on carotid duplex color flow imaging, upper and lower extremity arterial and venous duplex/color flow imaging, and ankle brachial indices, including the clinical history, physical assessment, and appropriate scanning protocol. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD370 - Techniques and Applications of Radiation Therapy 370-3 Techniques and Applications of Radiation Therapy. The technical aspects of radiotherapy including dosimetry, shielding, radioactive sources and methodology. Lecture and laboratory format. Restricted to RADS majors. Lab fee: $100.

RAD374 - Sectional Anatomy 374-3 Sectional Anatomy and Imaging Applications. This course focuses on identifying anatomical structures produced by Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scanners in the transverse, sagittal, coronal, and orthogonal planes. The MRI and CT images place emphasis on the head, neck, spine, chest, abdomen, pelvis, musculoskeletal (joints), and vascular system. Restricted to major.

RAD379A - Abdominal Sonography I 379A-3 Abdominal Sonography I. A study of abdominal anatomy; physiology; patient care; and imaging/interventional techniques. Emphasis will be placed on normal and abnormal vascular, hepatic, biliary, splenic, and renal systems and associated sonographic patterns. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD379B - Abdominal Sonography II 379B-3 Abdominal Sonography II. A continuation in the study of abdominal anatomy; physiology; patient care; and imaging/interventional techniques. Emphasis will be placed on normal and abnormal peritoneal, retroperitoneal, gastrointestinal, superficial structures and associated sonographic patterns. Prerequisite: RAD 379A with a minimum grade of "C". Concurrent enrollment in RAD 359B required. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD379C - Abdominal Sonography II 379C-3 Abdominal Sonography II. A continuation in the study of abdominal anatomy; physiology; patient care; and imaging/interventional techniques. Emphasis will be placed on normal and abnormal peritoneal, retroperitoneal, gastrointestinal, superficial structures and associated sonographic patterns. Prerequisite: RAD 379A with a minimum grade of "C". Restricted to major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD380 - Physics of Radiation Therapy 380-3 Physics of Radiation Therapy. Includes a study of the physical principles and applications of radiation in therapy. Defines the nature of radiation, radioactivity, interactions with matter and different radiation therapy instrumentation. Review of basic radiation therapy principles for use in later courses.

RAD384 - MRI Technology 384-4 Magnetic Resonance Imaging Technology. This course will focus on the physical principles of magnetic resonance imaging. Topics of discussion will include the history of magnetic resonance imaging, its physical principles, instrumentation, imaging techniques, contrast agents, patient care/safety, and quality assurance. Prerequisite: completion of ARRT in radiography, or consent of school. Limited to major.

RAD389 - Ultrasound Physics 389-3 Ultrasound Physics and Instrumentation. A study of diagnostic medical ultrasound physics. Topics include ultrasound wave generation and propagation; transducers;
pulse echo instruments; pulse echo imaging; image storage and display; Doppler; artifacts; quality assurance; bioeffects and safety. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD389A - Ultrasound Physics/Instrumentation** 389A-3 Ultrasound Physics and Instrumentation. A study of diagnostic medical ultrasound physics. Topics include ultrasound wave generation and propagation; transducers and sound beams; pulse echo instruments; pulse echo imaging; Doppler; artifacts; and image storage & display. Restricted to major or consent of school.

**RAD389B - Advanced Ultrasound Physics** 389B-2 Advanced Ultrasound Physics Instruments. A continuation of diagnostic medical ultrasound physics to include Doppler instrumentation; artifacts; quality assurance; bioeffects and safety; and emerging technologies. Prerequisite: RAD 389A with a minimum grade of C. Concurrent enrollment in RAD 359B, RAD 379B required.

**RAD390 - Oncology Nursing** 390-2 Oncology Nursing. This course will include nursing techniques on patients with cancer, anatomy, staging of disease, and radiobiologic effects of radiation on the patient.

**RAD394 - MRI and CT Pathology** 394-3 MRI and CT Pathology. This course is designed as an overview of pathologies commonly seen in magnetic resonance imaging and computed tomography. Along with distinguishing various types and pathologies as seen on MRI and CT scan, emphasis will be placed on a general understanding of the description, etiology, epidemiology, signs and symptoms, imaging characteristics, treatment, and prognosis of those pathologies. Restricted to major.

**RAD399A - Clinical Practicum I (Lab)** 399A-2 Clinical Practicum I (Lab). A study of sectional anatomy in the transverse, longitudinal and coronal planes, with emphasis on abdominal/small parts, ob/gyn, and vascular ultrasound procedures and protocols. This is the laboratory that must be taken concurrently with RAD 359A and RAD 379A and includes a $100 laboratory fee. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD399B - Clinical Practicum II** 399B-4 Clinical Practicum II. A study of sectional anatomy in the transverse, longitudinal and coronal planes, with emphasis on vascular and obstetric procedures and protocols. This is the laboratory component of RAD 359A and RAD 379A and includes a $100 laboratory fee. Must be taken concurrently with RAD 359B and RAD 379B. If RAD 359B or RAD 379B is dropped then RAD 399B must be dropped. Prerequisite: RAD 399A with a minimum grade of C. Comprehensive course information may be accessed in the "Master Plan" document located in the program director's office. Restricted to RADS majors.

**RAD399C - Clinical Practicum III (Lab)** 399C-2 Clinical Practicum III (Lab). A study of sectional anatomy in the transverse, longitudinal and coronal planes, with emphasis on abdominal/small parts, ob/gyn, and vascular ultrasound procedures and protocols. This is the laboratory that must be taken concurrently with RAD 369. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD400 - Radiation Dosimetry** 400-3 Radiation Dosimetry. Includes a study of the principles of radiation dosimetry and related calculations. Topics include calibration, protection, dose determination to points of interest, and basic treatment planning.

**RAD404 - MRI & CT Clinical Internship I** 404-10 MRI and CT Clinical Internship I. This is first clinical internship in a two-course sequence. During the first clinical internship, the student will be assigned to a selected clinical education center for the entire semester. During this semester, the student is expected to practice and perfect the professional skills developed the previous semester on campus. Not for graduate credit. Co-requisite: RAD 414. Prerequisite: "C" or better in RAD 364, 374, 384, 394.

**RAD409A - Clinical Practicum IV (Clinic)** 409A-4 Clinical Practicum IV (Clinic). The student is assigned to a clinical education center(s) to practice and perfect sonography skills. The student will be supervised by qualified sonographers and directed in specific experiences designed to meet course objectives. Restricted to RADS major or consent of school. Students must receive a grade of "B" or higher to advance within the Sonography Program.

**RAD409B - Clinical Practicum V (Clinic)** 409B-8 to 10 Clinical Practicum V (Clinic). The student is assigned to a clinical education center(s) to practice and perfect sonography skills. The student will be
supervised by qualified sonographers and directed in specific experiences designed to meet course objectives. Restricted to RADS major or consent of school. Students must receive a grade of "B" or higher to advance within the Sonography Program.

**RAD409C - Clinical Practicum V**

409C-10 Clinical Practicum V. The student is assigned to a clinical education center(s) to practice and perfect sonography skills. The student will be supervised by qualified sonographers and directed in specific experiences designed to meet course objectives. Prerequisite: RAD 409B with a minimum grade of C.

**RAD410 - Radiation Therapy Intern I**

410-10 Radiation Therapy Clinical Internship I. This is the first clinical internship of a two-course sequence. A practicum at a selected clinical education center in which the student functions under direct supervision and applies the knowledge gained in the classroom. The student will function in the clinical setting to interpret and execute the radiation oncologist's orders and operate the ionizing radiation equipment during actual patient treatments and simulations. Construction of treatment aids will also be performed. Not for graduate credit. Prerequisite: A grade of C or better in RAD 360, 370, 380, 390, and 400.

**RAD414 - Special Studies in MRI/CT**

414-2 Special Studies in MRI and CT. Individual projects in MRI and CT will be selected by the student with approval of the instructor and culminate in case study reviews. In addition, the student will prepare to challenge The American Registry of Radiologic Technologists professional examinations in either MRI or CT. A portion of this course is on-campus. Not for graduate credit. Prerequisite: "C" or better in RAD 364, 374, 384, and 394.

**RAD415 - Research Methods**

415-3 Research Methods. (Same as DH 411) This course will introduce the student to the various mechanisms by which scholarly and professional research are conducted. These include quantitative and qualitative methodologies, historiographical, and a mixed methods approach. Restricted to the major or consent of school.

**RAD420 - Special Problems Rad Therapy**

420-2 Special Problems in Radiation Therapy. A review of the many types of cancer to include discussion of clinical symptoms, treatment patterns, technical pitfalls, survival statistics and patient/family interactions. Quality assurance procedures for a Radiation Therapy Department will also be reviewed to include the different QA tests, tolerances, and frequencies. Both written and oral seminar responses will be included in this course. Not for graduate credit. Prerequisite: RAD 360, 370, 380, 390, 400.

**RAD424 - MRI/CT Clinical Internship II**

424-4 MRI and CT Clinical Internship II. This is the second clinical internship in a two-course sequence. The student will be assigned to a selected clinical education center. During this semester, the student will continue to perfect his/her professional skills developed during the previous clinical internship. In addition, the student will focus on developing hands-on skills in radiation therapy treatment simulation, interventional techniques, stereotactic procedure and trauma. Not for graduate credit. Prerequisite: "C" or better in RAD 404 and RAD 414. Concurrent enrollment in RAD 434.

**RAD425A - Readings-Radiology Education**

425A-3 Readings in Radiology Education. (Same as DH 425A) Supervised readings of the student's primary area of interest will be conducted under the direction of a faculty member. This is a writing intensive, independent study course. Restricted to the major or consent of school.

**RAD425B - Readings-Radiology Management**

425B-3 Readings in Radiology Management. (Same as DH 425B) Supervised readings of the student's primary area of interest will be conducted under the direction of a faculty member. This is a writing intensive, independent study course. Restricted to the major or consent of school.

**RAD430 - RT Internship II**

430-4 Radiation Therapy Clinical Internship II. This is the second clinical internship of a two-course sequence. A clinical practicum at a selected clinical education center in which the student functions under direct supervision and applies the knowledge gained in the classroom and Clinical Internship I. The student will practice and improve the professional skills developed the previous semester to include radiation therapy treatment, simulation and medical dosimetry. Students receive a "B" or higher to successfully complete the radiation therapy specialization. Not for graduate credit.
Prerequisite: A grade of B or better in RAD 410 and RAD 420. Concurrent enrollment required in RAD 440.

**RAD434 - Seminar in MRI and CT**
434-2 Seminar in MRI and CT. This course is designed to prepare the student to challenge The American Registry of Radiologic Technologists professional examinations in either MRI or CT. During the course the student will take mock registry exams in either MRI or CT and review pertinent material. Career development activities will include interviewing techniques, resume and cover letter preparation, and the application process. Not for graduate credit. Prerequisite: "C" or better in RAD 404 and RAD 414. Concurrent enrollment in RAD 424.

**RAD435 - Problems Rad Educ & Mgmt**
435-3 Problems in Radiology Education and Management. (Same as DH 435) The purpose of this course is to identify problems/issues within Radiology Education and Management and to present viable solutions to those problems/issues. Utilizing scholarly research and correlative research from other fields, the student will engage in integrated problem solving. This is an independent study course, conducted under the direction of a faculty member, and is a writing intensive course.

**RAD440 - Seminar in RT**
440-2 Seminar in Radiation Therapy. This course is designed to prepare the student to challenge the American Registry of Radiologic Technologists Radiation Therapy exam. During this course, the student will take mock registry exams in the specialty of radiation therapy and go through review materials. A portion of this course is on-campus. Professional development is addressed. Students must receive a "B" or higher to successfully complete the radiation therapy specialization. Not for graduate credit. Prerequisite: A "B" or better in RAD 410 and RAD 420. Co-requisite: A "B" or better in RAD 430.

**RAD444 - CNS Imaging in MRI**
444-3 Central Nervous System Imaging in Magnetic Resonance Imaging. Lecture includes discussion of imaging applications of the central nervous system. Review of related anatomy and common pathologies. Special approval needed from the instructor.

**RAD454 - Body Imaging in MRI**
454-3 Body Imaging in Magnetic Resonance Imaging. Lecture includes discussion of the imaging applications of the gastrointestinal, genitourinary, hepatobiliary and musculoskeletal systems. Review of related anatomy and common pathologies. Special approval needed from the instructor.

**RAD459 - Advanced OB/GYN Sonography**
459-2 Advanced Obstetric & Gynecology Sonography. A continuation in the study of obstetric & gynecology sonography to include pathologic, embryologic, and structural complications, clinical history, physical assessment, and the appropriate exam protocol. Prerequisite: RAD 359B with a minimum grade of C.

**RAD459A - Adv OB & GYN Sonography I**
459A-1 Advanced Obstetric & Gynecology Sonography I. A continuation in the study of obstetric & gynecology sonography to include pathologic, embryologic, and structural complications, clinical history, physical assessment, and the appropriate exam protocol. Prerequisite: RAD 359B with a minimum grade of C. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD459B - Adv OB & GYN Sonography II**
459B-1 Advanced Obstetric & Gynecology Sonography II. A continuation in the study of obstetric & gynecology sonography to include pathologic, embryologic, and structural complications, clinical history, physical assessment, and the appropriate exam protocol. Prerequisite: RAD 459A with a minimum grade of C. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

**RAD464 - Cardiac Imaging in MRI**
464-3 Cardiovascular Imaging in Magnetic Resonance Imaging. Lecture includes discussion of the imaging applications of the heart and coronary arteries. Review of related anatomy and common pathologies. Special approval needed from the instructor.

**RAD469 - Advanced Vascular Sonography**
469-3 Advanced Vascular Sonography. A continuation in the study of vascular anatomy, physiology, hemodynamics, wave form analysis, and treatment of vascular disease. Emphasis will be placed on renal, intracranial, vein mapping, hemodialysis graft, plethysmography, and venous insufficiency duplex/color flow testing, including clinical history, physical assessment, and appropriate exam protocol. Prerequisite: RAD 369 with a minimum grade of C.
RAD474 - Advanced MRI Internship 474-6 Advanced MRI Internship. During this clinical internship, the student will be assigned to a selected clinical education center for the entire semester. During this semester, while performing routine MRI procedures, the student will perform MRI procedures of the heart, body, and extremities. Special approval needed from the instructor.

RAD476 - Research Project 476-4 Research Project. (Same as DH 476) This course requires the selection and investigation of a research topic culminating in a paper to satisfy the research requirement for the MGT/Ed option. Prerequisite: RAD 415.

RAD479 - Advanced Abdominal Sonography 479-2 Advanced Abdominal Sonography. A continuation in the study of abdominal sonography to include interventional, organ transplant, musculoskeletal, pediatric topics, clinical history, physical assessment, and appropriate exam protocol. Prerequisite: RAD 379B with a minimum grade of C.

RAD479A - Adv Abdominal Sonography I 479A-1 Advanced Abdominal Sonography I. A continuation in the study of abdominal sonography to include interventional, organ transplant, musculoskeletal, pediatric topics, clinical history, physical assessment, and appropriate exam protocol. Prerequisite: RAD 379B with a minimum grade of C. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD479B - Adv Abdominal Sonography II 479B-1 Advanced Abdominal Sonography II. A continuation in the study of abdominal sonography to include interventional, organ transplant, musculoskeletal, pediatric topics, clinical history, physical assessment, and appropriate exam protocol. Prerequisite: RAD 479A with a minimum grade of C. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD480 - The U.S. Health Care System 480-3 The U.S. Health Care System. (Same as DH 480, HCM 360) This course is a study of the major components which comprise the U.S. health care system. This course will focus primarily on basic terminology, history, settings, personnel, access to care, types of care, utilization of services, vulnerable populations and future challenges for the delivery of health care services. Students will closely review clinical aspects and terminologies as they relate to medical conditions, medical equipment, and medical procedures for the purposes of interacting successfully with health care administrators, physicians/providers of care, and patients. This is a labor intensive course requiring extensive out-of-class study. Restricted to the major or consent of school.

RAD481 - Org Behavior Healthcare Orgs 481-3 Organizational Behavior in Healthcare Organizations. (Same as DH 481, HCM 364) An evaluation of relationships in healthcare organizations. Study of the motivational factors of those focused on patient care vs. those focused on profits and how to modify behaviors to achieve proper balance. Environmental factors of the healthcare field are evaluated for their impact on the behavior and employee-management relations of healthcare professionals and patient care providers. Promotes effective planning and organizing within the complex and highly regulated healthcare industry and assures alignment of organizational goals with the missions/visions/values as related to quality of patient life and organizational success. Restricted to SAH major/minor or with consent of SAH Academic Advisor.

RAD482 - Legal Aspects 482-3 Legal Aspects and Current Issues in Health Care. (Same as DH 482, HCM 388) Principles of law and the U.S. legal system are applied, in part, through case study and an exploration of current events, in the areas of health care management. Legal issues include malpractice, contracts, corporate liability, professional liability, patient rights, and the legal aspects of managed care.

RAD484 - Special Topics in MRI/MRA 484-3 Special Topics in MRI/MRA. Supervised readings of selected topics in MRI. Special approval needed from the instructor.

RAD489 - Pediatric Sonography 489-3 Pediatric Sonography. A study of neonatal and pediatric head, spine, hip, abdomen, and urinary systems anatomy, physiology, and pathophysiology. Topics will include patient care, integration of data, and imaging protocol. Restricted to RADS major or consent of school. Students must receive a grade of "C" or higher to advance within the Sonography Program.

RAD494 - Independent Study in MRI 494-1 to 6 Independent Study in Magnetic Resonance Imaging. The selection and investigation of a topic related to MRI. Special approval needed from the instructor.
RAD499 - Sonography Seminar 499-1 to 3 Sonography Seminar. This course is designed to prepare the student to challenge the national sonography certification examination(s). Professional development and career readiness topics are also addressed. Prerequisite: RAD 409B or RAD 459 or RAD 459A or RAD 479A with a minimum grade of C.

Radiologic Sciences Faculty

Collins, Kevin Scott, Professor and Director, Ph.D., RT(R)(T), CMD, Southern Illinois University Carbondale, 2011.
Szekely, Rosanne, Assistant Professor, RT(R), M.S., Southern Illinois University Carbondale, 1995.
Watts, Sandra J., Assistant Professor, MHA, University of St. Francis, 2013.

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Southern Illinois University
Carbondale, IL 62901
Phone: (618) 453-2121

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