

## Radiologic Sciences

### COLLEGE OF APPLIED SCIENCES AND ARTS

#### Graduate Faculty:

**Collins, Kevin Scott**, Professor, Ph.D., Southern Illinois University Carbondale, 2011. Radiation therapy.

**Collins, Sandra K.**, Professor, Ph.D., Southern Illinois University Carbondale, 2003; 2000. Health care management.

**Hirsch, Brandon**, Clinical Instructor, M.S., Southern Illinois University Carbondale, 2013.

**McKinnies, Richard**, Associate Professor, M.S., Southern Illinois University Carbondale, 2000, 2003.

**Mobile, Katherine**, Lecturer, M.S., University of Wisconsin-LaCrosse, 2011.

The Radiologic Science professional is a member of the health care team who has knowledge of the characteristics and clinical relevance of radiographic imaging, is cognizant of patient care procedures and has the education and expertise necessary to generate diagnostic medical images including sonograms, computer and, MRI images, and x-rays. The mission of the Master of Science in Radiologic Sciences program through Southern Illinois University (SIU) is to provide a quality program integrating education, research, and service in order to meet the needs of the profession and improve health care of the people and communities we serve.

Several specific objectives and goals of the program would be to:

- Prepare the student to practice as a radiologic sciences educator or manager by offering a balanced curriculum and quality didactic/experiential instruction.
- Provide didactic and experiential opportunities that lead to research in educational, professional, or health care issues relating to radiologic sciences education and/or management.
- Provide avenues to students for development and growth within the profession.
- Provide avenues for students to develop and apply skills in effective communication, analytical and critical thinking, and problem solving necessary for successful allied health practice.
- Provide an experiential and didactic environment which leads to the refinement of skills and competence appropriate for an advanced educator/manager in the radiologic sciences.
- Provide an accessible opportunity for regional radiologic science professionals to acquire a terminal degree.
- Provide an accessible opportunity for regional radiologic sciences professionals to acquire the necessary means to succeed in a global and diverse workforce/workplace.

The minimum admission guidelines of the MSRS program mirror those of the Graduate School at SIU; however, to elaborate on those requirements, the following is provided:

- Candidates will be granted admittance to the SIUC Graduate School.
- Candidates will possess a baccalaureate degree and have completed a program of study in an associated field to Allied Health, Radiology, Sonography, Medical Imaging,

Health Care Management, or an equivalent field.

- Candidates will be nationally licensed by the ARRT, the ARDMS, the NMDCB, or an equivalent National or International Licensing Body in diagnostic imaging.
- Candidates will have a minimum cumulative grade point average (GPA) of at least 2.7 (where 4.0 = A).
- Student background checks will only be completed if required in the legal agreement to perform the internship.
- The GRE is not required for admission to this program.
- TOEFL score requirements will follow the requirements set forth by the SIUC Graduate School.
- Transfer students will follow the same criteria as all other students.
- Students will complete and submit an application for enrollment in the MSRS program and submit a \$65 application fee to the program.

The MSRS program is a comprehensive program that will prepare students to enter the professional workforce with a graduate degree in radiology, specializing in either management or education. The academic objectives of the program include:

1. Successful completion of 30 didactic credit hours (RAD 511, 516, 521, 526, 531, 536, 541, 546, 551, and 556) plus objective 2 or 3; and
2. Successful completion of RAD 593 which consists of six credit hours of research/thesis project, culminating in a final scholarly work as outlined by the SIUC Graduate School; or
3. Successful completion of RAD 595 which consists of a six credit hour (240 contact hours) internship in either education or management, dependent upon the student's area of interest. (The internship is an option if obtaining state licensure/permission to perform the internship is feasible.)

To facilitate completion of the objectives of the program, the course of instruction will consist of 36 semester hours. As part of these 36 semester hours, students will complete a research/thesis project.

The curriculum will consist of didactic courses. Course material will cover educational theory (including the foundations of education) and/or management theory. Additionally, advanced study of radiologic sciences coursework including radiation physics, radiation biology, anatomy, pharmacology, human disease/pathology, advanced imaging methods, advanced imaging modalities, and patient care will be undertaken for individuals choosing education as their area of specialization. Upon program completion, the student is expected to be fully capable of teaching these topics at an introductory level for basic radiologic science professionals. Special project assignments, conference attendance and presentations, and journal article reviews are an integral part of the curriculum.

All students graduating from the MSRS program will be required to meet the qualifications of the graduate school at SIUC. Students will be required to complete a culminating scholarly work which may include a research/thesis paper, or graduate project.

### Sample Schedule of Course Offerings

#### Master of Science in Radiologic Sciences (MSRS)

**36 semester hours are required for successful completion of this program.**

#### Fall Semester

- RAD 511-3 Fundamentals of Health Care Systems
- RAD 516-3 Cultural Foundations and Theories of Education
- RAD 521-3 Advance Practice of Radiologic/Imaging Sciences I
- RAD 526-3 Seminar in Radiologic/Imaging Sciences I

#### Spring Semester

- RAD 531-3 Human Resources in Health Care
- RAD 536-3 Strategic Leadership in Healthcare
- RAD 541-3 Advance Practice of Radiologic/Imaging Sciences II
- RAD 546-3 Seminar in Radiologic/Imaging Sciences II

#### Summer Semester

- RAD 551-3 Legal and Ethical Fundamentals of Health Care
- RAD 556-3 Individual Research in Healthcare
- RAD 601-1 per semester Continuing Enrollment

**Final Portion of Program - Must complete one of the following:**

- RAD 593-6 Individual Research

The delivery method will be through distance education via Desire2Learn or the current classroom management system in use at SIU.

### Courses (RAD)

**RAD 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.

**RAD 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.

**RAD 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.

**RAD 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.

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

instructor.

**RAD 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.

**RAD 510-2 Simulation and Cross Sectional Anatomy in Medical Dosimetry.** This course covers the conventional and CT simulation techniques used in initiating radiation therapy for cancer patients. Identification of cross-sectional anatomy at different anatomical locations within the human body is also reviewed. This course is twenty weeks in length. Restricted to admission to the Medical Dosimetry Program.

**RAD 511-3 Fundamentals of Health Care Systems.** (Same as MHA 511, MHI 511) This course provides a multi-disciplinary analysis and is designed to provide students with information pertaining to the issues surrounding access to care, medical technology, and the complex financial structures of the healthcare system. Students will extensively examine aspects of the complex healthcare system such as managed care, Medicare, Medicaid, pharmaceuticals, health promotion and disease prevention, and the quality of care.

**RAD 515-4 Medical Dosimetry Clinical I.** This is the first course of a three course sequence. During the three course sequence, students will complete eight clinical rotations including Brachytherapy, Simulation, Gamma Knife, Treatment Aids, IMRT, External Beam, Physics, Special Measurements and QA. The length of these rotations varies from one to eleven weeks. During this course students will perform two to four of these rotations depending on the rotation schedule. While in the clinical setting students will observe and work directly with a medical dosimetrist. Emphasis is given on learning and understanding the role and responsibilities of a medical dosimetrist in the clinical setting. This course is twenty weeks in length. Restricted to admission to the Medical Dosimetry Program.

**RAD 516-3 Cultural Foundations and Theories of Education.** Seminar provides an examination of the historical, social, economic and psychological foundations of allied health education with emphasis given to the nature and role of education and training in preparing for the field of medical education. The objectives of this seminar will allow the student to explore the nature and theories of education, the behavioral aspects of education including the assumptions and practices which underlie education. Special approval needed from the instructor.

**RAD 520-3 The Physics of Medical Dosimetry I.** This course covers the following topics: Radiologic Physics, production of x-rays, radiation treatment and simulation machines, interactions of ionizing radiation, radiation measurements, dose calculations, computerized treatment planning, dose calculation algorithms, electron beam characteristics, and brachytherapy physics and procedures. This course is twenty weeks in length. Restricted to admission to the Medical Dosimetry Program.

**RAD 521-3 Advance Practice of Radiologic/Imaging Sciences I.** This course will include a review of the following topics: Radiation physics, radiation biology, anatomy, pharmacology, human diseases/pathology, advanced imaging methods, advanced imaging modalities, and patient care.

**RAD 525-3 Seminars in Medical Dosimetry I.** (Same as RAD 526) This course consists of various seminars/literature reviews

associated with radiation oncology. Topics include treatment techniques for various cancers, technological advances in cancer treatment, cancer treatment trends, and the role of a medical dosimetrist. This course is twenty weeks in length. Restricted to admission to the Medical Dosimetry Program.

**RAD 526-3 Seminar in Radiologic/Imaging Sciences I.** (Same as RAD 525) This course consists of various seminar/literature reviews associated with the radiologic/imaging sciences. Topics include imaging techniques, technological advances in the radiologic/imaging sciences, patient care trends, and the role of an imaging professional. This course is twenty weeks in length.

**RAD 530-2 The Essentials of Medical Dosimetry.** This course covers the various quality assurance procedures performed in a radiation oncology department. Also included are various statistics topics to educate the student in becoming a good consumer of medical dosimetry research literature. Professional development, billing/coding, HIPAA, and professional service are also addressed. This course is twenty weeks in length. Prerequisite: A grade of C or better in RAD 510, RAD 515, RAD 520, and RAD 525.

**RAD 531-3 Human Resources in Health Care.** (Same as MHA 531, MHI 531) Describes the key human resource functions that play a significant role in the healthcare environment and focuses specifically on how those functions support management initiatives and accreditation and/or regulatory compliance. Extensive review of how the failure to systematically apply effective human resource strategies can result in organizational demise is conducted. Conduct a human resource audit. Explores the dynamic legal and regulatory environment and carefully examines how legislative changes influence the healthcare organization overall focusing particularly on those functions that are linked to patient satisfaction and balanced scorecards and/or benchmarking of provider performance.

**RAD 535-4 Medical Dosimetry Clinical II.** This is the second of a three course sequence. During the three course sequence, students will complete eight clinical rotations including Brachytherapy, Simulation, Gamma Knife, Treatment Aids, IMRT, External Beam, Physics, Special Measurements and QA. The length of these rotations varies from one to eleven weeks. During this course students will perform two to four of these rotations depending on the rotation schedule. While in the clinical setting students will observe and work directly with a medical dosimetrist. Emphasis is given on learning and understanding the role and responsibilities of a medical dosimetrist in the clinical setting. This course is twenty weeks in length. Prerequisite: A grade of C or better in RAD 515.

**RAD 536-3 Strategic Leadership in Healthcare.** (Same as MHA 536, MHI 536) This course provides students with an examination of nature, function, and techniques of administration and supervision in HCOs. Topics include the ever-changing healthcare environment and trends impacting leadership competencies. Specific healthcare factors that influence organizing managing of varying health systems such as hospitals vs. ambulatory care. Focus will be given on the professional bureaucracy that is complex given regulatory issues, political factors, and the era of the informed patient.

**RAD 540-3 The Physics of Medical Dosimetry II.** This course covers the following topics: Imaging for radiation oncology, IMRT, stereotactic radiosurgery, special procedures, particle therapy, hyperthermia, and radiation safety. This course is

twenty weeks in length.

**RAD 541-3 Advance Practice of Radiologic/Imaging Sciences II.** This course will continue to cover the same topics that were reviewed in RAD 521 but to a greater level of understanding. Topics include: Radiation physics, radiation biology, anatomy, pharmacology, human disease/pathology, advanced imaging methods, advanced imaging modalities, and patient care.

**RAD 545-3 Seminar in Medical Dosimetry II.** (Same as RAD 546) This course consists of various seminars associated with radiation oncology. Topics include treatment techniques for various cancers, technological advances in cancer treatment, cancer treatment trends, and the role of a medical dosimetrist. This course is twenty weeks in length.

**RAD 546-3 Seminar in Radiologic/Imaging Sciences II.** (Same as RAD 545) This course consists of various seminar/literature reviews associated with the radiologic/imaging sciences. Topics include imaging techniques, technological advances in the radiologic/imaging sciences, patient care trends, and the role of an imaging professional. This course is twenty weeks in length.

**RAD 550-2 Medical Dosimetry Clinical III.** This is the third course of a three course sequence. During the three course sequence, students will complete eight clinical rotations including Brachytherapy, Simulation, Gamma Knife, Treatment Aids, IMRT, External Beam, Physics, Special Measurements and QA. The length of these rotations varies from one to ten weeks. During this course students will perform one to two of these rotations depending on the rotation schedule. While in the clinical setting students will observe and work directly with a medical dosimetrist. Emphasis is given on learning and understanding the role and responsibilities of a medical dosimetrist in the clinical setting. This course is ten weeks in length. Prerequisite: A grade of "C" or better in RAD 535.

**RAD 551-3 Legal and Ethical Fundamentals of Health Care.** (Same as MHA 551, MHI 551) This course provides students with an analysis of the legal and ethical environment of the healthcare industry. Focused on the healthcare environment, the course closely examines the judicial process pertaining to torts, contracts, antitrust, corporate compliance, access to care, negligence, and professional liability. The nature of ethics in the multi-cultural healthcare environment is examined with analysis of the moral issues in healthcare. Restricted to Medical Dosimetry students.

**RAD 555-2 The Physics of Medical Dosimetry III.** This course covers the following topics: MU calculations, point dose calculations and radiation biology. This course is ten weeks in length. Prerequisite: A grade of C or better in RAD 540.

**RAD 556-3 Individual Research in Healthcare.** (Same as MHA 556) This course requires students to complete a research project in the field of healthcare based upon student interest and instructor approval. Each project will have a written paper as a final product and this paper will be submitted for publication, as approved by the instructor, in one of the professional journals within the field of healthcare. Restricted to Medical Dosimetry.

**RAD 560-2 Seminar in Medical Dosimetry III.** This course consists of various seminars/literature reviews associated with radiation oncology. Topics include treatment techniques for various cancers, technological advances in cancer treatment, cancer treatment trends, and the role of a medical dosimetrist. This course is ten weeks in length. Prerequisite: A grade of C

or better in RAD 545.

**RAD 565-1 to 6 Independent Study.** Directed independent study in selected areas of medical dosimetry studies. Special approval needed from the Program Director.

**RAD 593-6 Individual Research.** (Same as MHA 593, MHI 593) A research course leading to the completion of a research paper that demonstrates the student's knowledge of research techniques. Research is based on the selection and investigation of a research topic culminating in a paper satisfying the research requirements for the Master of Science in Radiologic Sciences degree and is in accordance with the policies and guidelines as established by Southern Illinois University Carbondale's (SIUC) Graduate School. Prerequisite: RAD 556. Restricted to RADS majors or consent of Program Director.

**RAD 601-1 Continuing Enrollment.** This course is required to satisfy the Graduate School's requirement of continuous enrollment and is intended for those students who are enrolled in the program but cannot take a core academic course during a given semester. Prerequisite: Consent of Program Director.