IMAGING SCIENCES (MSIS)

MSIS 5000. Radiation Physics. 3 Credit Hours.
This course applies to Radiography, Phase I, and Computed Tomography, (CT) Phase 2. The first semester radiography student will be introduced to the fundamental principles of ionizing radiation. During the course of this semester, the student will be presented with material covering the discovery of X-ray, properties, terminology, Electricity and Magnetism, Electromagnetic Radiation, unit and tube, production, and emission spectrum. The course provides an introduction to the effects of ionizing radiation on the human body, and optimizing radiation protection for patients, self and other healthcare providers. Radiation biology and concepts as ALARA, ionizing radiation interaction with matter, and early and late effects of ionizing radiation will be introduced. Open for Cross Enrollment on Space Available Basis.

MSIS 5001. Patient Assessment and Management. 3 Credit Hours.
General and system specific concepts related to the causation and clinical presentations of pathology across the life span are discussed. Prototype diseases are used to illustrate pathologic concepts. Use of medical interviews, physical examinations, and interpretation of examination findings will be introduced. Instruction on the components of the health history (chief complaint, present illness, past history, family history, personal and social history, review of symptoms) is provided. Physical examination including the general survey of the patient, vital signs, skin, head and neck exam, thorax and lungs, cardiovascular and peripheral vascular systems, breasts and axillae, abdomen, genitalia and rectal exams, musculoskeletal system, and the mental status and nervous system exams will be introduced. Cardiovascular, diuretic and respiratory agents, hypoglycemic agents, drugs acting on the blood and blood forming organs, toxicology, antibiotics and cancer chemotherapeutic agents will be discussed. Students will receive training for CPR certification. The student will be expected to pass both clinical competency evaluations related to this course.

MSIS 5002. Radiographic Procedures I with Lab. 3 Credit Hours.
This course applies to Radiography (Phase I). This course, the first of a two-semester sequence, provides detailed instruction in the fundamental principles of positioning for all routine radiographic procedures. It includes relevant topographic anatomy and cross-sectional anatomy instruction. Also included in this course is an instruction in procedures that are unique to pediatrics, geriatrics, obesity, mobile radiography, trauma and operating room. This course integrates with the Clinical Practicum I and is divided into categories, each having its own laboratory component. The categories are chest, abdomen, extremities, pelvis, and the bony thorax. Emphasis is placed on critical evaluation of images and problem-solving skills about producing diagnostic radiographs.

MSIS 5003. Image Production & Evaluation. 2 Credit Hours.
This course applies to Radiography (Phase I) and will provide students with the principles of image creation. The primary focus of this course will be the process of digital imaging to include characteristics, image identification, computed radiography, direct digital radiography, image processing and display, as well as information about RIS, DICOM and PACS.

MSIS 5004. Radiobiology & Protection. 3 Credit Hours.
This course applies to Radiography (Phase I) and Computed Tomography, (CT) Phase 2. Content will include review and continuation of basic radiobiology involved with radiography and advanced modalities, such as CT. 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.

MSIS 5005. Sectional Anatomy and Pathophysiology I with Lab. 2 Credit Hours.
This course, the first of a two-semester sequence, and is designed as a survey of human anatomy and selected pathology from a regional rather than system perspective. Students will become accustomed to viewing anatomy of regions of the body in the different anatomical planes typically produced in cross-sectional imaging. Special emphasis will be placed upon correlating and recognizing anatomical structures as they appear on medical images produced with Radiography, CT, and MRI. The anatomy of the: cranium and facial bones, brain, spine, and neck will be covered. Students will also solidify concepts learned from the modules with hands-on learning in the lab using the Anatomage® table.

MSIS 5006. Radiographic Procedures II with Lab. 3 Credit Hours.
This course applies to Radiography (Phase I) and will continue to provide students with detailed instruction on increasingly difficult radiographic examinations to include; spine, headwork, contrast imaging, genitourinary studies, venography, arteriography, arthrography, myelography and hysterosalpinography. It includes relevant topographic anatomy and cross-sectional anatomy instruction. Continued emphasis will be placed on critical evaluation of images and problem-solving skills in relation to producing diagnostic radiographs. This course integrates with the Clinical Practicum I and is divided into categories, each having its own laboratory component. Prerequisites: MSIS 5002.

MSIS 5007. Sectional Anatomy and Pathophysiology II with Lab. 2 Credit Hours.
This course is a continuation of Sectional Anatomy I with Lab human anatomy course. The purpose of this course is for the student to learn the essentials of cross-sectional anatomy of the human body. Students will solidify concepts learned from the modules with hands-on learning in the lab using the Anatomage® table. The anatomy of the: thorax, abdomen, pelvis, and extremities. Prerequisites: MSIS 5005.

MSIS 5008. Special Radiographic Procedures. 2 Credit Hours.
This course applies to Radiography (Phase I) and it provides an overview of alternate imaging modalities including: Cardiovascular Interventional Imaging, Neuro-Interventional, Computed Tomography, Nuclear Medicine Technology, DEXA, Diagnostic Medical Sonography, Mammography and Magnetic Resonance Imaging, and Radiation Therapy. Included in the discussions of these alternate imaging modalities will be necessary requirements to become certified in the areas. The course aims to educate radiologic personnel in basic pharmacology principles, ensuring quality patient care. Contrast media is used by most modalities of diagnostic Imaging. Topics include uses, prevention of acute reactions, contrast induced nephropathy, renal adverse reaction. Prerequisites: MSIS 5002.

MSIS 5009. Ethics and Law. 2 Credit Hours.
This course is designed to provide the student with an overview of medical imaging and focuses on the legal system, basic foundational theories of ethics, and practical application of to health care situations. Policies and procedures of the program will be covered. The student will be oriented to the profession in relation to various accreditation and credentialing agencies. The course explores the legal, moral values and judgments as they apply to medicine and ethical principles associated with research. It also elaborates on the ethical decision-making framework, and the legal and ethical principles that govern the practice of medicine. 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, and key legal aspects of these issues.

MSIS 5010. Clinical I. 6 Credit Hours.
This course applies to Radiography (Phase I). Supervised clinical experience in radiography (Phase 1). This course is designed so the students gain the clinical experience needed to function in an active imaging sciences department and initiate the student in patient care and routine radiographic imaging procedures. This experience is intended to give the student the confidence to assist and perform radiographic procedures that parallel progress in didactic education. The clinical education experience is competency-based with professional components included to document the needed clinical procedures. Review of medical imaging with an emphasis on problem-solving and critical thinking.

MSIS 5011. Research. 3 Credit Hours.
This course introduces students to methods of scientific research to include review of literature, research designs, sampling techniques, measurement, and related issues. 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. Using Google Scholar, CINAHL, PubMed and Other Library Resources, students will choose evidence-based topic in imaging and conduct a critical review of its components, Research topics includes oncology treatments, imaging in orthopedics, evidence-based practice in radiography/CT/MRI, innovations in pediatric imaging and fusion imaging.

MSIS 5012. Clinical II. 6 Credit Hours.
Supervised clinical experience in Radiography (Phase I). This course is an extension of Clinical I. This course provides experience for the student in Radiography (Phase 1). Prerequisites: MSIS 5010.

MSIS 5013. RAD Registry Review. 2 Credit Hours.
This course applies to Radiography (Phase I). This course builds on the previous learning related to Radiography. This course will allow the students to engage in self-directed study to prepare for the American Registry of Radiologic Technologist (ARRT) in Radiography 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. Prerequisites: MSIS 5010.

MSIS 5014. Clinical III. 6 Credit Hours.
This course applies to Radiography (Phase I). Supervised clinical experience in the radiography (Phase 1). This course is designed so the students gain the clinical experience needed to function in an active imaging sciences department and initiate the student in patient care and routine radiographic imaging procedures. This experience is intended to provide the student with the confidence needed to assist and perform radiographic procedures that parallel progress in the didactic education. The clinical education experience is competency-based with professional components included to document the needed clinical procedures. Review of medical imaging with an emphasis on problem solving and critical thinking. Prerequisites: MSIS 5012.

MSIS 6000. CT Physics and Instrumentation. 3 Credit Hours.
This course applies to CT (Phase 2) and 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: MSIS 5013 Open for Cross Enrollment on Space Available Basis.

MSIS 6001. CT Procedures. 3 Credit Hours.
This course applies to CT (Phase 2). 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. The content is divided into three units: (1) head, neck and spine, (2) chest and abdomen, and (3) pelvis and extremities. The student also becomes familiar with contrast administration guidelines and timing issues related to dynamic imaging. Spiral CT, 3D reconstruction procedures, and vascular imaging are discussed and compared with routine imaging of the same anatomical regions. Prerequisites: MSIS 5013 Open for Cross Enrollment on Space Available Basis.

MSIS 6002. Education. 3 Credit Hours.
This course will provide students with an introduction to basic principles and techniques used in Imaging Sciences Professional 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 medical imaging professional role in education, patient education, in-service education, course design, curriculum development and models, objectives and goals, lesson plan development, learning activities, use of media, teaching methods, development of presentations, testing, and evaluation.

MSIS 6003. Clinical IV. 9 Credit Hours.
Supervised clinical experience in the CT (Phase 2). This clinical course will allow the student to achieve final competencies in CT. Students gain hands-on experience with different types of CT imaging scanners and procedures. Students are expected to master the techniques for each category of CT procedures and will be required to demonstrate competency for a range of routine procedures. Supervised clinical experience in CT (Phase 2). Prerequisites: MSIS 5014.

MSIS 6004. CT Registry Review II. 2 Credit Hours.
This course applies to CT (Phase 2) and 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) in CT 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 CT with an emphasis on problem solving and critical thinking. Prerequisites: MSIS 5013.

MSIS 6005. Clinical V. 10 Credit Hours.
This course is an extension of Clinical IV and will allow the student to achieve final competencies in CT (Phase 2). Students will begin MRI Phase 3 hands-on experience with different types of MR imaging scanners and procedures. Supervised clinical experience in CT (phase 2) and MRI (Phase 3). Supervised clinical experience in the CT (Phase 2) and MRI (Phase 3). Prerequisites: MSIS 6003.

MSIS 6006. MRI Physics & Safety. 3 Credit Hours.
This course applies to MRI (Phase 3) and 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, 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. MRI safety policies and procedures will be reviewed for hospitals/medical centers, and research facilities.

MSIS 6007. Management and Supervision. 3 Credit Hours.
This course focuses on practices and principles related to developing leadership skills. The Association of Hospital Radiology Administrators (AHRA) provides a credentialing exam, Certified Radiology Administrator (CRA) for leaders in medical imaging. This course will provide foundational preparation for the credential exam offered by the AHRA. The course reviews each subject area covered in the exam: fiscal management, human resource management, operations management, asset management, and communication and information management.

MSIS 6008. MRI Procedures. 3 Credit Hours.
This course applies to MRI (Phase 3) and is designed to provide an understanding of proper protocols and positioning utilized to acquire appropriate imaging with patient history in mind concepts of MRI. Protocol and positioning topics include indications for procedure, preparation, positioning and landmarks, patient history and assessment, scan parameters for brain, spine, upper and lower extremity imaging, female and male pelvis, abdominal imaging, cardiac and breast imaging. Open for Cross Enrollment on Space Available Basis.

MSIS 6009. MRI Registry Review III. 2 Credit Hours.
This course builds on the previous learning related in MRI (Phase 3). This course will allow the students to engage in self-directed study to prepare for the American Registry of Radiologic Technologist (ARRT) in MRI 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 MRI with an emphasis on problem solving and critical thinking. Prerequisites: MSIS 6004.

MSIS 6010. Clinical VI. 9 Credit Hours.
This course is an extension of Clinical V and will allow the student to achieve final competencies in MRI (Phase 3). The student will participate in a series of classroom demonstrations and practice in venipuncture. The student will complete a self-learning packet of materials required by the Radiology Department for all technologists, nurses, and students who wish to practice venipuncture in the department. The student will prove competency by passing a clinical with a radiology nurse. Prerequisites: MSIS 6005.