BMSc Medical Imaging Core Courses

MI 201. Introduction to Medical Imaging

Fall. Credit, two hours. This course introduces the student to the principles and practices of medical imaging. The function of radiographer and their relationship with the health care team is stressed. The student is also oriented to the hospital environment and health care systems.

MI 203. Medical Terminology

Fall. Credit, 1 hour. This online course introduces the student to medical terminology. Emphasis is placed on terminology pertinent to diagnostic radiology.

MI 211A, B, C. Patient Care I, II, and III

Fall, Spring, and Spring. Credit, 9 hours total. Prerequisites: MI 211A prior to MI 211B prior to MI 211C. Basic patient care needs and interpersonal relationships with patients, peers, physicians, and other members of the health care team are stressed. Basic principles of radiographing the pediatric patient and geriatric patient are included. Confidentiality and medico-legal considerations including professional liability, patient records, and professional guidelines are introduced. MI 211C focuses on advanced patient care techniques such as cardiac monitoring and trauma situations.

MI 213A, B, C, D, E. Medical Imaging Procedures I, II, III, IV, and V

Fall, Spring, Summer, Fall, and Spring. Credit, 13 hours total. Prerequisites: MI 213A prior to MI 213B prior to MI 213C prior to MI 213D prior to MI 213E. Lecture, online, and laboratory course emphasizing routine and specialized procedures used in diagnostic radiology.

MI 221A, B, C. Anatomy and Physiology I, II, and III

Fall, Spring, and Fall. Credit, 9 hours total. Prerequisite: MI 221A prior to MI 221B prior to MI 221C. Human anatomy, emphasizing the body tissues and all body systems, especially the skeletal system is introduced. Cross-sectional anatomy is the focus of MI 221C. Emphasis is placed on radiographic anatomy in all courses.

MI 301. Survey of Medical and Surgical Diseases

Summer. Credit, 3 hours. Prerequisites: MI 203, MI 221A-C. An overview of common diseases intended to orient the technologist to the nature of a patient’s disease is presented. Emphasis is placed on the radiographic appearance of common pathologies.

MI 321A, B. Physical Principles of Imaging I and II

Spring and Summer. Credit, 6 hours total. Prerequisites: MI 321A prior to MI 321B. Fundamentals of radiologic physics and its application to diagnostic radiology are included. These courses include both the rudiments of basic physics and elementary principles of electricity and magnetism required for understanding x-ray production and interaction.
MI 323. Medical Imaging Safety

Summer. Credit, 2 hours. Radiation protection, personnel monitoring, radiation shielding, and patient protection are introduced in this course. Emphasis is placed on protection mechanisms utilized in diagnostic radiology. Safety issues related to CT and MRI are also presented.

MI 325A, B. Principles of Radiographic Technique I and II

Summer and Fall. Credit, 6 hours total. Prerequisites: MI 325A prior to MI 325B. Technical factors regulating the four radiographic qualities of density (brightness), contrast resolution, detail (spatial resolution), and distortion are emphasized. Students acquire the skills necessary to adapt technical factors in order to produce diagnostic radiographs.

MI 327. Computer Applications in Medical Imaging

Fall. Credit, 1 hour. This course introduces the student to the use of computers in radiology.

MI 329. Image Processing Technique

Summer. Credit, 3 hours. Current trends in automatic processing, including routine and preventive maintenance are presented. Film characteristics (contrast, speed, latitude, and resolution) and film handling techniques are included. Concepts in digital image processing are also introduced.

MI 390R. Medical Imaging Seminar

Fall and Spring. Credit, 2 hours total. These courses will explore a current topic in the radiologic sciences. Discussion of journal readings pertinent to the assigned topic will be required.

MI 411. Pharmacology

Summer. Credit, 2 hours. Prerequisites: MI 221A, B, MI 211A-C. This course is designed to provide basic concepts of pharmacology. The theory and practice of basic techniques of venipuncture and the administration of diagnostic contrast agents and/or intravenous medications is included. The appropriate delivery of patient care during these procedures is emphasized.

MI 421. Imaging Equipment

Spring. Credit, 2 hours. Prerequisites: MI 321A, B, MI 325A, B. This course introduces the student to the different types of imaging systems. The basic principles of digital imaging, CT, MRI, mammography, and sonography are presented.

MI 423. Radiation Biology

Fall. Credit, 2 hours. Prerequisites: MI 321A, B, and MI 323. This course involves the study of organisms following absorption of energy from ionizing radiation. Interactions of radiation in matter, short and long-term biological effects, and cell survival kinetics are emphasized.
MI 425. Quality Control

Fall. Credit, 2 hours. Prerequisites: MI 321A, B, and MI 329. This course focuses on external factors affecting the quality of a radiograph. Emphasis is placed on the measurement of beam quality, control of automatic processors, and image receptor evaluation.

MI 427. Evaluation and Measurement

Spring. Credit, 3 hours. Prerequisites: All prior courses. This course utilizes various methods to determine achievement of cognitive competencies. Preparation for the ARRT national certifying examination is emphasized.

MI 496R. Independent Study

Spring. Credit, 2 hours. Prerequisites: All prior courses. This course involves the completion of a research paper and project on a selected medical imaging topic. The findings must then be presented to the class in a formal presentation.

MI 497R. Directed Study

Fall. Credit, 2 hours. This course involves preliminary preparation for the national certifying examination, as well as the completion of a proposal and project plan on a pertinent topic in radiology.

MI 261A, B. Clinical Clerkship

Fall and Spring. Credit, 6 hours total. Prerequisites: MI 261A prior to MI 261B.

MI 361A, B, C. Clinical Internship

Summer, Fall, and Spring. Credit, 12 hours total. Prerequisites: MI 361A prior to MI 361B prior to MI 361C.

MI 461A, B, C. Clinical Practicum

Summer, Fall, and Spring. Credit, 12 hours total. Prerequisites: MI 461A prior to 461B prior to MI 461C.

Management Track Course Descriptions

MI 430. Principles of Management

Summer. Credit, 3 hours. This course will explore management theory and practice and their impact on the development and performance of organizations. Through a critical assessment of the classical and alternative approaches to the discipline, the student will learn the essentials of leadership of contemporary organizations in a global environment. Related topics such as human resource management, organizational development and change, and their effect on productivity and performance will be examined.
MI 431. Business Communication

Summer. Credit, 3 hours. This course is designed for the professional whose activities require communicative abilities in a variety of interpersonal group situations. This course will help students develop an understanding of the communication process and will allow students to critically evaluate their skills. Methods of effective oral and written presentation will be introduced.

MI 433. Organizational Behavior

Fall. Credit, 3 hours. This course will examine the theories and practice of organizational behavior. Individual and group behaviors in organization will be addressed. Organizational dynamics and the development of work environment that fosters successful team building will be studied. Case studies will also be used to enhance students' experiences.

MI 435. Hospital Organization and Personnel Management

Fall. Credit, 3 hours. This course will explore health care systems and contemporary problems and issues in health care administration. Functional and structural aspects of the hospital organization will also be discussed - authority, responsibility and role relationship of the governing board, administration and medical staff. The internal and external forces affecting the administrative process will be included.

MI 437. Health Care Finance

Spring. Credit, 3 hours. Decision-making processes as they relate to effective management of financial resources will be discussed. Students will acquire knowledge in interpreting health care institution financial reports and techniques of financial planning and control. Emerging trends in the system and the changing roles of government, and other private providers will be discussed.

MI 439. Principles of Marketing

Spring. Credit, 3 hours. This course provides students with an understanding of modern marketing practice, philosophy, marketing decisions, market segmentation, product positioning, buyer psychology, and behavior and new product development. Marketing represents both a key function and philosophy that provides a foundation for the successful operation of all business and nonprofit organizations today. Marketing executives perform the essential tasks of planning the firm's competitive market position, product distribution, and advertising strategies.

MI 463A, B, C. Management Practicum I, II, and III

Summer, Fall, and Spring. Credit, 6 hours total. The practicum will involve an individually designed learning experience. It will be a field-based experience designed to reinforce classroom content and to help the student make a successful role transition into a health care setting. The student will be assigned to radiology departments for administrative practical experience. The course is designed to help the student identify a systematic approach to: work-flow analysis, organization, department budget, planning, record systems, job evaluations, quality assurance, and other problem-solving tasks.
**Education Track Course Descriptions**

**MI 440. Introduction to Medical Imaging Education**

Summer. Credit, 3 hours. This course provides an overview of radiologic science education. Professional organizations and accreditation requirements influencing the curriculum will be identified. The student will be introduced to effective lesson preparation and utilization of selected multimedia materials.

**MI 441. Methods and Materials of Teaching Medical Imaging**

Summer. Credit, 3 hours. This course involves the development of instructional materials for specific units in the radiography curriculum. Objectives, lesson plans, visual aids, and evaluation instruments will be developed. Emphasis will be placed on the organization and presentation of educational materials.

**MI 443R. Practice Teaching (Didactic)**

Fall and Spring. Credit, 5 hours total. These courses prepare the student for teaching basic radiologic science didactic material. The student will prepare lesson plans, present course material, and evaluate student progress in selected subject areas.

**MI 445R. Practice Teaching (Clinical)**

Fall and Spring. Credit, 5 hours total. These courses prepare the student for teaching in the clinical setting. Concepts related to clinical objectives, instructional methodologies, scheduling, and competency evaluation are introduced. Students will be assigned to work with students in the clinical education settings.

**MI 447. Administration of Medical Imaging Programs**

Spring. Credit, 3 hours. This course will explore contemporary problems and issues in radiologic science program administration. Functional and structural aspects of the program organization will also be discussed. This course also involves the design of a radiologic science program according to the Joint Review Committee on Education in Radiologic Technology Standards or comparable guides for other imaging disciplines. Emphasis is placed on the determination program compliance with the JRCERT Standards.

**Computed Tomography Track Course Descriptions**

**MI 450. CT Physics and Instrumentation**

Summer. Credit, 3 hours. Physics topics covered include the characteristics of radiation, CT beam attenuation, linear attenuation coefficients, tissue characteristics, and Hounsfield number application. Data acquisition and manipulation techniques and image reconstruction algorithms will be explained. CT systems and operations will be fully explained.
MI 451A, B, C. CT Procedures I, II, and III

Summer, Fall, and Spring. Credit, 6 hours total. CT protocols will be taught for differentiation of specific structures and pathology. Patient history, education and preparation, contrast media type, amount and administration route, patient positioning and orientation, scan parameters, and filming will be covered. These courses complement Clinical Practicum I, II, and III.

MI 465A, B, C. CT Practicum I, II, and III

Summer, Fall, and Spring. Credit, 9 hours total. These courses involve the application of didactic information in the clinical setting. The student will observe, assist, and perform basic patient care and clinical procedures under direct supervision. The student will be required to demonstrate competency in numerous CT procedures.

Magnetic Resonance Imaging Track Course Descriptions

MI 453A, B, C. MRI Physics and Instrumentation I, II, and III

Summer and Fall. Credit, 6 hours total. These courses introduce the student to the concepts related to production of the MR image. Pulse sequences, parameters and tissue characteristics, types of magnets, gradient fields, and spectroscopy will be covered in these courses.

MI 455A, B, C. MRI Procedures I, II, and III

Summer, Fall, and Spring. Credit, 6 hours total. MRI protocols will be taught for differentiation of specific structures and pathology. Patient history, education and preparation, contrast media type, amount and administration route, patient positioning and orientation, scan parameters, and filming will be covered. These courses complement Clinical Practicum I, II, and III.

MI 467A, B, C. MRI Practicum I, II, and III

Summer, Fall, and Spring. Credit, 9 hours total. These courses involve the application of didactic information in the clinical setting. The student will observe, assist, and perform basic patient care and clinical procedures under direct supervision. The student will be required to demonstrate competency in numerous MRI procedures.

Interventional Radiology Track Course Descriptions

MI 457A, B, C: Advanced Clinical Procedures I, II, and III

Summer, Fall, and Spring. Credit, 7 hours total. IR protocols will be taught for differentiation of specific structures and pathology. Patient history, education and preparation, contrast media type, amount and administration route, patient positioning and orientation, filming and common pathology will be covered. These courses complement Advanced Clinical Practicum I, II, and III.
MI 465A, B, C: Advanced Clinical Practicum I, II, and III

Summer, Fall, and Spring. Credit, 9 hours total. These courses involve the application of didactic information in the clinical setting. The student will observe, assist, and perform basic patient care and clinical procedures under direct supervision. The student will be required to demonstrate competency in numerous IR procedures.

Women’s Health Track Course Descriptions

MI 457a, b, c: Advanced Clinical Procedures I, II, and III

Summer, Fall, and Spring. Credit, 7 hours total. Mammography and bone densitometry protocols will be taught for differentiation of specific structures and pathology. Patient history, education and preparation, contrast media type, amount and administration route, patient positioning and orientation, filming and common pathology will be covered. These courses complement Advanced Clinical Practicum I, II, and III.

MI 465a, b, c: Advanced Clinical Practicum I, II, and III

Summer, Fall, and Spring. Credit, 9 hours total. These courses involve the application of didactic information in the clinical setting. The student will observe, assist, and perform basic patient care and clinical procedures under direct supervision. The student will be required to demonstrate competency in mammography and bone densitometry procedures.