BMSc Medical Imaging Course Descriptions (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, one hour. This 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, nine hours. 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 concepts including cardiac monitoring and venipuncture.

MI 213a, b, c, d, e: Medical Imaging Procedures I, II, III, IV, and V
Fall, Spring, Summer, Fall, and Spring. Credit, thirteen hours total. Prerequisites: MI 213a prior to MI 213b prior to MI 213c prior to MI 213d prior to MI 213e. Lecture, on-line, 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, nine hours total. Prerequisite: MI 221a prior to MI 221b prior to MI 221c. Human anatomy, emphasizing the body tissues and systems, is included. Emphasis is placed on the skeletal system and other systems closely associated with imaging. Cross-sectional anatomy is the focus of MI 221c. Emphasis is placed on radiographic anatomy in all courses.

MI 261 a, b: Clinical Clerkship
Fall and Spring. Credit, six hours total. Prerequisites: MI 261a prior to MI 261b. A series of courses designed for persons entering the field of Medical Imaging to become familiar with the practical application of theories, principles, morals and ethics of Medical Imaging and the medical field. The students will go from observation to participation in general diagnostic exams.

MI 301: Survey of Medical and Surgical Diseases
Summer. Credit, three hours. Prerequisites: MI 203, MI 221 a-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. The effects of pathology on radiographic quality and diagnostic radiologic procedures will be considered.

MI 321a, b: Physical Principles of Imaging I and II
Spring and Summer. Credit, six hours total. Prerequisites: MI 321a prior to MI 321b.

Fundamentals of radiologic physics and its application to diagnostic radiology are covered. 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, two 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, six hours total. Prerequisites: MI 325a prior to MI 325b. Technical factors regulating the four radiographic qualities of receptor exposure, contrast, spatial resolution, and distortion are emphasized. Students acquire the skills necessary to adapt technical factors in order to produce diagnostic radiographs in the digital imaging environment.

MI 327: Computer Applications in Medical Imaging
Fall. Credit, one hour. This course introduces the student to the use of computers in radiology.

MI 329: Image Processing Technique
Summer. Credit, three hours. Current trends in the processing, analysis, manipulation, and display of digital radiographic images. Capture of image data from CR and DR detectors is discussed. Pre- and post- image processing operations are presented. The calculation and evaluation of exposure indicators is explained. The practical application of radiographic techniques, technique myths, and image evaluation in digital imaging are discussed. Digital image artifacts are also explained.

MI 361a, b, c: Clinical Internship
Summer, Fall and Spring. Credit, twelve hours total. Prerequisites: MI 361a prior to MI 361b prior to MI 361c. A series of courses designed for persons entering the field of Medical Imaging to become familiar with the practical application of theories, principles, morals and ethics of Medical Imaging and the medical field. Students begin to master basic skills in the operation of a radiographic room and in radiographic positioning. Students work independently under indirect supervision after successful competency evaluation. Students will also experience a variety of advanced imaging modalities.

MI 390r: Medical Imaging Seminar
Fall and Spring. Credit, two hours total. These courses will explore a current topic in the radiologic sciences. Discussion of journal and textbook readings pertinent to the assigned topic will be required.

MI 411: Pharmacology
Summer. Credit, two 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 procedures requiring contrast administration is emphasized.

MI 421: Imaging Equipment
Spring. Credit, three 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, interventional radiology and mammography equipment are presented.

MI 423: Radiation Biology
Fall. Credit, two 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, two hours. Prerequisites: MI 321a, b and MI 329. This course focuses on external factors affecting the quality of an image. Emphasis is placed on healthcare and imaging accrediting bodies, radiographic equipment evaluation, and repeat analysis. It includes didactic and lab components.

MI 427: Evaluation and Measurement
Spring. Credit, three 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 461a, b, c: Clinical Practicum
Summer, Fall, and Spring. Credit, twelve hours total. Prerequisites: MI 461 a prior to 461b prior to MI 461c. A series of advanced clinical education courses designed for persons entering the field of Medical Imaging to practice independently all general radiography examinations after successful competency evaluation. These courses prepare students to enter the workforce as a general diagnostic radiographer with exceptional work ethic.

MI 496r: Independent Study
Spring. Credit, two 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, two 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.

Course Descriptions (Administration Track)

MI 430: Principles of Management
Summer. Credit, three 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, three 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, three 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, three 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: Healthcare Finance.
Spring. Credit, three 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, three 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 non-profit 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, six hours total. The practicum will involve an individually designed learning experience. It will be a field-based experience designed to reinforce didactic content and to help the student make a successful role transition into a health care setting as a supervisor, manager or administrator. The student will be assigned to radiology departments for

administrative practical experience. The courses are 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.

Course Descriptions (Education Track)

MI 431: Business Communication
Summer. Credit, three 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 435: Hospital Organization and Personnel Management
Fall. Credit, three 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 440: Introduction to Medical Imaging Education
Summer. Credit, three 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, three 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 (Clinical)
Fall and Spring. Credit, five 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 445r: Practice Teaching (Didactic)
Fall and Spring. Credit, five 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 447: Administration of Medical Imaging Programs
Spring. Credit, three 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*.

Course Descriptions (Computed Tomography Track)

MI 450: CT Physics and Instrumentation
Summer. Credit, three 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, six 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, image display and common pathology 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, nine 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 complete specific repetitions in accordance with the ARRT requirements.

Course Descriptions (Magnetic Resonance Imaging Track)

MI 453a, b, c: MRI Physics and Instrumentation I, II, and III
Summer, Fall, and Spring. Credit, six hours total. These courses introduce the student to the concepts related to production of the MR image. **MR basics, image weighting and contrast, encoding, parameters, pulse sequences, flow phenomena, artifacts, vascular and cardiac imaging, contrast agents, and functional MRI** will be covered in these courses.

MI 455a, b, c: MRI Procedures I, II, and III
Summer, Fall, and Spring. Credit, six hours total. MRI protocols will be taught for differentiation of specific structures and pathology. **MRI safety, instrumentation and equipment, patient care and preparation, contrast media type, amount and administration route, patient positioning and orientation, scan parameters, filming and common pathology 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, nine 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 complete specific repetitions in accordance with the ARRT requirements.

Course Descriptions (Interventional Radiology Track)*

MI 457a, b, c: Advanced Clinical Procedures
Summer, Fall, and Spring. Credit, seven hours total. IR protocols will be taught for differentiation of specific anatomic structures and pathology. Patient history, education and preparation, contrast media type, amount and administration route, patient positioning and orientation, imaging 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, nine 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 complete specific exam repetitions in accordance with ARRT requirements.

Course Descriptions (Women's Health Track)*

MI 457a, b, c: Advanced Clinical Procedures
Summer, Fall, and Spring. Credit, seven hours total. A series of advanced procedure courses designed for persons entering the field of Women's Health to become familiar with the theories, principles, and practices of mammography and bone density. Fundamentals, equipment, quality control, image production, anatomy, pathology, and basic procedures 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, nine 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 complete specific repetitions in accordance with the ARRT requirements for both mammography and bone densitometry procedures.

***Please note that advanced coursework in the interventional radiology and women's health tracks will be discontinued in 2021.**