MOLECULAR IMAGING AND THERAPEUTICS (MIT)

MIT 5110 - Physical Principles
Credit(s): 3 Credits
This class will cover the history of magnetic resonance imaging, matter, magnetism, signal production, and the physics related to imaging. This includes MR signal induction, sampling and conversion, along with tissue characterization; T1 and T2 relaxation; signal decay; K-space; Fourier transformation; spatial encoding; and image characteristics. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5120 - Cross Sectional Anatomy and Pathology
Credit(s): 3 Credits
Students will become familiar with MRI cross-sectional anatomy and will learn how to view and to image the human body in multiple planes. They will learn specific imaging planes and protocols for specific exams as well as contrast usage and recognition. The pathology of the various body regions (including neurological, visceral, musculoskeletal, soft tissue, and vasculature) will be discussed as it relates to MR imaging. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5130 - Instrumentation and Quality Analysis
Credit(s): 3 Credits
This class covers all components of MR imaging equipment including the main and secondary magnet systems, RF coils, the acquisition console, and all ancillary equipment. The various types of magnets, gradients, and shielding will be covered, as well as maintenance, quality analysis and operational workflows. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5140 - Clinical MRI and Image Production
Credit(s): 5 Credits
Students will learn the clinical aspects of MRI. This includes the basics of image production and the corresponding pulse sequences. Imaging parameters for intrinsic image contrast characteristics, proper sequence selection, adjustment of imaging options, administration and utility of contrast media, and use of post-processing applications are included. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5150 - Patient Care and MRI Safety
Credit(s): 3 Credits
This class will cover the handling, care, and safety of patients, visitors, and staff in the MRI environment. This includes the proper education and screening of anyone or any equipment entering the magnetic and RF fields. Patient assessment, communication and care, as well as ethical and legal principles will be included. Emergency procedures and their effect on patients, staff, and the public will also be discussed. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5210 - Clinical MRI Practicum
Credit(s): 9 Credits
Students will perform a variety of MRI procedures in multiple clinical settings under the direct supervision of qualified medical professionals. Students will interact with patients ranging from infants to geriatrics and apply the skills necessary for patient and personnel safety. The practicum allows students to practice skills necessary to obtain high quality MR images, to alter protocols objectively based on patient anatomy and pathology or physical condition, and to identify image quality and equipment problems to make appropriate corrections. Clinical experience will include venipuncture and the administration of contrast media. (Offered every Spring)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5220 - Advanced/Emerging Technologies
Credit(s): 3 Credits
An exploration of the emerging technologies and advances in MRI, including their impact on imaging and healthcare, will be presented. In addition, a correlation between MRI and other imaging modalities (Computed Tomography, Nuclear Medicine/PET, Ultrasound, etc.) will be discussed. This course will include MRI simulation labs and assignments. (Offered every Spring)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5310 - Radiation Physics
Credit(s): 2 Credits
This course provides a study of atomic structure, radioactive decay modes, x-ray production, mathematics of decay, and interaction of radiation with matter. Radiation units, regulations regarding maximum permissible exposures to radiation, radiation monitoring and surveying, and principles of radiation protection are covered along with concepts in dosimetry. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5320 - XRT Radiation Therapy Practice I
Credit(s): 3 Credits
This course is an introduction to radiation therapy practice and the practitioner's role. Principles of radiation therapy treatment, health safety, ethics, the radiation therapy professional's scope of practice and responsibilities will be discussed and examined. Basic operational issues will be discussed, including treatment parameters and delivery, equipment and emergency procedures. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5330 - Treatment Technique
Credit(s): 3 Credits
This course will introduce concepts and terminology of radiography and radiation therapy treatment set-ups. It will examine anatomy, positioning, immobilization, field boundaries, and standard beam arrangements for site-specific anatomical areas. Laboratory experiences include virtual simulation demonstrations and conventional/CT simulator practice with a phantom. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5340 - Treatment Planning
Credit(s): 2 Credits
This course will introduce concepts and terminology of radiation therapy treatment planning with an introduction to dosimetry. Students will examine and practice anatomical site-specific treatment planning which incorporates imaging, target volume delineation and dose prescription, delineation of organs at risk, and dose limitations. Included is a discussion on beam arrangements, energies, modalities, modifiers, calculations and dose evaluation. Demonstrations and practice with computer treatment planning systems enhances the course. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5350 - XRT Clinical Practicum I
Credit(s): 10 Credits
This practicum course includes content and clinical practice experiences that are designed for sequential development, application, analysis, integration, synthesis and evaluation of concepts and theories in radiation therapy. Clinical practice experiences shall be designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and administration of a prescribed course of treatment. Evaluation of competency and outcomes measurement of the student's clinical practice shall assure the well-being of the patient preparatory to, during and following delivery of radiation therapy treatment and services. (Offered Spring semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5360 - Emerging Technologies
Credit(s): 2 Credits
This course will introduce basic x-ray production and its uses plus advanced imaging technologies. A study of human anatomy as it relates to radiographic films and cross sectional human anatomy is also covered. (Offered Fall Semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5400 - Radiation Oncology Patient Care and Quality Management
Credit(s): 3 Credits
This course provides foundational concepts in assessment and evaluation of the patient undergoing radiation therapy along with the responsibilities of the radiation therapist in caring for the patient. Psychological and physical needs affecting treatment outcomes will be presented. Incorporated into the course are the principles and guidelines of a quality management program in radiation oncology, including clinical process, equipment, and documentation that demonstrate patient care outcomes. Additionally, regulatory agencies and rules affecting the radiation oncology workplace, staff, and patients are emphasized. The role of the radiation therapist in patient care, safety and quality management is stressed. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5410 - Radiobiology and Radiation Protection
Credit(s): 2 Credits
This course presents basic concepts and principles of radiation biology integrated with radiation protection. The interactions of radiation with cells, tissues and the body as a whole and resultant biophysical events will be presented. Also covered are the basic concepts of radiation protection, radiation monitoring, environmental protection, the safe handling of radioactive materials, equipment use, and quality control. Radiation safety in radiation therapy departments and regulations that govern the use of radioactive is presented. The course provides a thorough examination of radiation safety from both the patient and therapist perspective. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5420 - XRT Radiation Therapy Practice II
Credit(s): 3 Credits
This course is designed to examine and evaluate the management of neoplastic disease. The epidemiology, etiology, detection, diagnosis, patient condition, treatment and prognosis of neoplastic disease will be presented, discussed and evaluated in relationship to histology, anatomical site and patterns of spread. The radiation therapist's responsibility in the management of neoplastic disease will be presented and discussed. (Offered Spring semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5430 - Capstone in Radiation Therapy
Credit(s): 1 Credit
Students enrolled in this course develop an individual research project for presentation that is a culmination of the knowledge obtained in the didactic and clinical coursework within the Radiation Therapy Program. This project is worked on independently with program faculty mentorship and is required for graduation. Some didactic review and professional development content is included.
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5440 - XRT Clinical Dosimetry
Credit(s): 3 Credits
Reviews basic concepts introduced in Treatment Planning, further examining factors that influence and govern dose determination and planning treatment for radiation therapy patients. Emphasizes the clinical application of photon and electron beam characteristics, dose calculations, and factors relating to safely and optimally treating the radiation therapy patient. Some focus is directed on clinical dosimetry and treatment. planning for radiation oncology special procedures. Demonstrations and practice with computer treatment planning systems enhances the course. (Offered Spring semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5450 - Clinical Practicum II
Credit(s): 0 Credits
This course is a continuation of MIT 5350 Clinical Practicum I which includes the application, analysis, integration, synthesis and evaluation of concepts and theories in radiation therapy. Clinical practice experiences shall be designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and administration of a prescribed course of treatment. Evaluation of competency and outcomes measurement of the student's clinical practice shall assure the well-being of the patient preparatory to, during and following delivery of radiation therapy treatment and services. (Offered Summer semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5510 - Radiation Physics and Radiation Protection Radiation Physics and Radiation Protection
Credit(s): 4 Credits
This course provides a study of atomic structure, radioactive decay modes, x-ray production, mathematics of decay, and interaction of radiation with matter. Radiation units, regulations regarding maximum permissible exposures to radiation, radiation monitoring and surveying, and principles of radiation protection. Concepts in radiobiology and dosimetry are covered. (Offered in Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5520 - Radiochemistry and Radiopharmacy
Credit(s): 3 Credits
This course provides a study of basic radiopharmaceutical principles, generators, chemistry of radionuclides and their associated compounds, dosage forms, quality control and regulations. This course will include demonstrations and lab exercises in the radiopharmacy. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5530 - Nuclear Medicine Instrumentation
Credit(s): 2 Credits
This course provides a study of Nuclear Medicine Instrumentation that is based on the theory of radiation detection with application to current imaging instruments. Students will be introduced to tomographic imaging cameras, including SPECT and PET/CT, with their necessary quality control. This course will include demonstrations and lab exercises to reinforce concepts explained in the classroom. (Offered every Fall)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5540 - NMT Clinical Nuclear Medicine
Credit(s): 5 Credits
This course provides a study of the applications of radiopharmaceuticals used in diagnosis and therapy, different techniques and procedures utilized including indications for studies and correlation with various disease states. This course will also include concepts and applications dealing with patient care, the health care delivery systems, CPR, and health related agencies. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5550 - Nuclear Medicine Information Systems
Credit(s): 3 Credits
This course provides an introduction to basic hardware and software components of a computer system. Emphasis will be given to understanding basic computer principles with application to data acquisition and processing in nuclear medicine. (Offered Fall semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5610 - Imaging Practicum
Credit(s): 7 Credits
Students will perform in a wide variety of nuclear medicine procedures, including in vivo, diagnostic and therapeutic treatments in multiple clinical settings under the direct supervision of qualified medical professionals. (Offered Spring semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5620 - Radiochemistry Practicum
Credit(s): 3 Credits
Students will prepare radiopharmaceuticals, perform associated quality control, dispense drugs and perform record keeping under the direct supervision of qualified medical professionals in a radiopharmacy setting. (Offered Spring semester only)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5630 - Emerging Technologies
Credit(s): 3 Credits
This course is designed to introduce students to advanced imaging technologies and techniques. The course will include a study of cross sectional human anatomy. (Offered every Spring)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5880 - NMT Clinical Practicum
Credit(s): 0 Credits
This course is a continuation of NMT 5610. Students will perform in a wide variety of nuclear medicine procedures, including in vivo, diagnostic and therapeutic treatments in multiple clinical settings under the direct supervision of qualified medical professionals.
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5890 - Clinical MRI Practicum II
Credit(s): 0 Credits
Students will perform a variety of MRI procedures in multiple clinical settings under the direct supervision of qualified medical professionals. Students will interact with patients ranging from infants to geriatrics and apply the skills necessary for patient and personnel safety. The practicum allows students to practice skills necessary to obtain high quality MR images, to alter protocols objectively based on patient anatomy and pathology or physical condition, and to identify image quality and equipment problems to make appropriate corrections. Clinical experience will include venipuncture and the administration of contrast media. (Offered every Spring)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5930 - Special Topics
Credit(s): 3 Credits (Repeatable for credit)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 5980 - Independent Study
Credit(s): 1 or 3 Credits (Repeatable for credit)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 6000 - Masters Seminar I
Credit(s): 1 Credit
This course is the first of three masters level seminar courses that build upon each other. This course will include the fundamentals of research with an overview of statistics including how statistical analyses are conducted and interpreted. This course will include how to search scholarly literature and how to critique scholarly literature. The student must select a topic that combines both of their previous area of expertise and their graduate areas of study for a project. (Offered Fall semester)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 6100 - Masters Seminar II
Credit(s): 2 Credits
This course is the second of the three masters level seminar courses that build upon each other. It will emphasize clinical research design including the daily operations of an established research study, the history of regulations, and how to apply this knowledge in the clinical setting. This course will introduce the details involved in operating a clinical trial and the terminology used in the research environment. (Offered Spring semester)
Prerequisite(s): MIT 6000 with a grade of B or higher
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 6200 - Masters Seminar III
Credit(s): 3 Credits
This course is the final course of three masters level seminar courses that build upon each other, culminating in a scholarly project suitable for publication in a peer-reviewed journal, professional presentation or equivalent. Students will be involved in an ongoing research project(s) or process(s) with a scholarly mentor to provide guidance in planning, coordinating, conducting and presenting the research. Students will have the opportunity to observe ongoing research, relate these experiences back to the Master Seminar I and II courses, and incorporate the knowledge from their modalities of study.
Prerequisite(s): MIT 6000 with a grade of B or higher; MIT 6100 with a grade of B or higher
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 6930 - Special Topics
Credit(s): 3 Credits (Repeatable for credit)
Restrictions:
Enrollment is limited to students with a major in Molecular Imaging/ Therapeutics.

MIT 6980 - Independent Study
Credit(s): 3 Credits (Repeatable for credit)
This course is intended for Molecular Imaging and Therapeutics (MIT) students who undertake a research project(s) in which the complexity of the work extends the project beyond the traditional MIT schedule. The length of this course may not extend the entire semester and the course will end upon completion of the contracted work.
Prerequisite(s): MIT 6000 with a grade of B or higher; MIT 6100 with a grade of B or higher; MIT 6200 with a grade of B or higher