ME.420 (RADIOLOGY AND RADIOLOGICAL SCIENCE)

Courses

ME.420.602. Radiological Physics and Dosimetry. 3 Credits.

ME.420.603. Radiation Therapy Physics. 3 Credits.
This course will provide a comprehensive survey of basic radiotherapy physics, fundamental radiation therapy, and contemporary radiation therapy.

ME.420.696. Research Elective in Radiology and Radiological Sciences.

ME.420.697. Extramural Elective in Radiology and Radiological Sciences.

ME.420.699. Radiology Elective.

ME.420.702. Radiological Physics and Dosimetry. 3 Credits.

ME.420.703. Radiation Therapy Physics. 3 Credits.
This course will provide a comprehensive survey of basic radiotherapy physics, fundamental radiation therapy, and contemporary radiation therapy. Topics to be covered include: external beam radiation therapy, brachytherapy, and special procedures. Image guidance methods will be discussed as well as patient and machine quality assurance.

ME.420.704. Radiation Protection and MR Safety. 3 Credits.
This course is one of the core courses for the master's in medical physics program. The course will cover the fundamental principles of radiation protection and safety. Topics to be covers within the course: principles of radiation protection, radiation units, radiation measurements, practical aspects of the use of radionuclides, ionizing radiation and public health. It will also cover the regulations regarding personal radiation protection and will include radiation shielding of x-ray facilities.

ME.420.705. Medical Physics Seminar. 0.5 Credits.
This seminar will focus on current topics in imaging, radioomics/AI, therapy, and radiopharm therapy.

ME.420.706. Radiation Biology. 3 Credits.
This course will cover the current state-of-the-art knowledge of the biological consequences of ionizing radiation at multiple length and time scales, including molecular, cellular, whole-body, and population effects, as well as how this knowledge relates to and is continually informed by applications in radiation therapy and radiation safety.

ME.420.707. Nuclear Medicine Imaging. 3 Credits.
This course covers the physics and methodology aspects of Nuclear Medicine imaging and Positron Emission Tomography

ME.420.708. Master's Research in Medical Physics (Summer). 3 - 9 Credits.

ME.420.709. Radiopharmaceutical Therapy. 3 Credits.
Learn about pharmaceutical therapy imaging, dosimetry, and radiobiology by pretending you are a medical physicist tasked with helping your physician optimize different RPTs and identify the best and most logistically feasible way to treat patients with RPTs. The course is less lecture and more collaborative problem-based learning.
Prerequisite(s): ME.420.706[C] AND ME.420.702[C] AND ME.420.707[C] AND EN.520.632

ME.420.710. Medical Imaging Systems. 3 Credits.
This course provides an introduction to the fundamentals of the most-important clinical medical imaging modalities, including X-ray, Mammography, Computed Tomography, Ultrasound, Nuclear Medicine, and Magnetic Resonance Imaging. The primary focus is on the physical principles, instrumentation design, and imaging algorithms of these systems. Strengths, weaknesses, and common clinical applications for each imaging modality are also discussed.

ME.420.711. Mass Spectrometry Imaging: Focus on MALDI Imaging. 1 Credit.
Mass spectrometry imaging (MSI) is a powerful technology in biomedical research, made available to the Johns Hopkins research community in the Applied Imaging Mass Spectrometry (AIMS) Core. The most widely used ionization technique used in overall MSI is matrix-assisted laser desorption/ionization (MALDI) imaging because of its high imaging speed and high spatial resolution. Spatially resolved MALDI imaging measurements are directly taken from frozen, formalin-fixed, or formalin-fixed paraffin-embedded (FFPE) tissue sections or cells deposited or grown on slides without destroying them. MALDI imaging combines mass spectrometric analyses of biomolecules with simultaneous histological evaluation to analyze intact proteins, tryptic peptides (on-tissue tryptic digest), N-glycans (on-tissue PNGase digest), peptides, lipids, metabolites, drug molecules, and drug metabolites in a spatially resolved manner. This course will cover the basics of MSI and then focus on MALDI imaging in including sample preparation, on-tissue digests and derivatizations, and data analysis and consists of online modules, quizzes, journal club, and a hands-on MALDI imaging in the AIMS Core including data analysis.