MEDICAL PHYSICS (MEDP)

MEDP 520. Introduction to Radiation Therapy Physics Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Provides practical exercises in the radiation measurement devices and quality assurance procedures commonly employed in radiation therapy physics. Measurements of beam characteristics for treatment machines, including electron linear accelerators, and radioactive sources, including high dose rate brachytherapy are investigated.

MEDP 561. Topographical Anatomy and Physiology. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Restricted to medical physics graduate students. This course will cover fundamental gross anatomy, pathology and physiology as necessary for medical physicists. It will include basic medical terminology and have a focus on cross-sectional CT imaging and MRI, as well as 2-D X-ray imaging. Basic information on pathophysiology of cancer diseases and cancer treatment strategies will be provided.

MEDP 563. Radiological Physics and Radiation Dosimetry. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the fundamental conceptual, mathematical and physical aspects of radiation interactions with matter and energy deposition, including a thorough understanding of basic quantities and units. Application to the principles and methods of radiation detection and dosimetry will be emphasized.

MEDP 564. Radiological Physics and Radiation Dosimetry Lab. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite: MEDP 563. Laboratory consisting of experiments and activities related with MEDP 563.

MEDP 567. Introduction to Radiation Therapy Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the fundamental conceptual and technical aspects of the use of ionizing radiation to evoke a therapeutic response/benefit to patients. Treatment planning and dose calculations for external beam radiation therapy and brachytherapy are emphasized.

MEDP 591. Special Topics in Medical Physics. 1-3 Hours.
Semester course; 1-3 lecture hours. 1-3 credits. Open to graduate students and to undergraduate students with advanced standing. An in-depth study of a selected topic in medical physics. See the Schedule of Classes for specific topics to be offered each semester and prerequisites. Applicable toward physics major requirements.

MEDP 592. Special Topics. 1-4 Hours.
Semester course; 1-4 variable hours. 1-4 credits. Lectures, tutorial studies, library assignments in selected areas of advanced study or specialized laboratory procedures not available in other courses or as part of the research training.

MEDP 601. Health Physics. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Theoretical foundation and practical application of health physics as applied to diagnostic radiology, nuclear medicine and radiation therapy. Regulatory and scientific aspects of the subject are covered. Mathematical models and physical principles of radioactive decay and radiation interactions are used to assess the relative values of different radiation safety practices.

MEDP 630. Radiobiology for the Medical Physicist. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the fundamental aspects of radiobiology with specific emphasis on relative biological effectiveness and linear energy transfer, the oxygen effect, radiation carcinogenesis, DNA repair, hereditary effects of radiation, radiation-induced cell killing, cellular responses to radiation including cell cycle effects and activation of cell signal transduction pathways, early and late effects of radiation, and time, dose and fractionation in radiotherapy.

MEDP 633. Advanced Radiation Therapy Physics. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours. 4 credits. Prerequisites: PHYS 563 and PHYS 567 or instructor's permission. The course presents a survey of modern developments and methodological tools used in the following areas of radiation oncology physics: experimental dosimetry, computational dosimetry, quality assurance and commissioning, and advanced treatment planning and delivery modalities. By means of hands-on projects and literature reviews, students will become acquainted with the medical physics literature and acquire practical skills in selected areas. The course consists of a coordinated set of didactic lectures and laboratory projects.

MEDP 635. Physics of Diagnostic Imaging. 3 Hours.
Semester course; 3 lecture and 1 laboratory hours. 3 credits. Covers the physics of X-ray production, radiography, fluoroscopy and computed tomography. Covers the basics of ultrasound physics, equipment, image quality, safety and quality assurance. Emphasis will be placed on the physical foundations of currently used diagnostic imaging techniques using X-rays and ultrasound and their relevance to the clinical setting.

MEDP 636. Physics of MRI. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Covers the physics of magnetic resonance imaging. Emphasis will be placed on the physical foundations of currently used diagnostic techniques and their relevance to the clinical setting. The classroom lectures will be enhanced through a series of integrated laboratory exercises.

MEDP 637. Physics of Nuclear Medicine. 2 Hours.
Semester course; 2 lecture and 1 laboratory hours. 2 credits. Covers the physics of nuclear medicine imaging (including PET). Emphasis will be placed on the physical foundations of currently used diagnostic techniques and their relevance to the clinical setting.

MEDP 682. Clinical Rotations in Medical Physics. 1-3 Hours.
Semester course; variable hours. 1-3 credits. May be repeated for credit. Prerequisites: at least one graduate medical physics course and permission of instructor. Clinical rotations in various medical physics sub-specialties.

MEDP 689. Medical Physics Literature Review. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Review and discussion of relevant journal articles from the medical physics literature. May be repeated for credit with instructor's permission.

MEDP 697. Directed Research. 1-15 Hours.
Semester course; 1-15 credits. May be repeated for credit. Prerequisites: at least one graduate-level physics course and permission of instructor. Research leading to the M.S. or Ph.D. degree.