Name
Part III Medical Physics

Prerequisites
The material should be accessible to all Part III students. The course is divided into two parts: the first 6 lectures concentrate on the basic physics of biomedical imaging, while the second 6 lectures provide a broad insight into the applications of physics in medicine. The latter half of the course should be accessible to all those with an interest in medical physics.

Learning outcomes
After attending this lecture series and completing supervision problems, students should be able to:

- Describe the importance of physics in medicine
- Understand the general principles of medical image reconstruction and registration
- Compare and contrast the medical imaging techniques that are available in a hospital setting and explain their relative merits
- Explain the difference between imaging with ionising and non-ionising radiation in the context of radiation dosimetry and risk
- Describe sensing and therapeutic applications of physics in medicine

Synopsis
Introduction: Historical background; radiation interactions; general imaging concepts; and contrast mechanisms.

Medical Imaging Methodology: For all clinically applicable imaging techniques, a detailed description of contrast mechanisms, data acquisition hardware and image reconstruction will be provided. This will cover: imaging with ionising radiation, including X-ray, CT, nuclear medicine, SPECT and PET; imaging with non-ionising radiation, including MRI and ultrasound; and general principles of image reconstruction and registration of images over time and between modalities.

Clinical Applications of Physics: Clinical examples of the utility of medical imaging in diagnosis and treatment of disease. Sensing applications of physics in hospitals, including patient monitoring. Therapeutic applications of physics, particularly radiotherapy in cancer patients.