1.	Title of the course	Medical Imaging
2.	Course number	EE516L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To EE5029/8
6.	To be offered by	Department of Electrical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT for UG
9.	**Course Objective(s):** The objective of this course is to provide students with an overview of the computational methods in medical imaging. The course covers the main sources of medical imaging data (X-Ray, CT, MRI, PET and ultrasound). In addition, this course presents various clinical applications and provides hands-on experience on various medical imaging Software tools. Many of the current methods used to enhance and extract useful information from medical images will be introduced	
10.	**Course Content:** Basic image processing: spatial transformations, Fourier series, Fourier transform, convolution, sampling theory, aliasing, interpolation; Medical imaging modalities: X-Ray, computed tomography, Positron emission tomography, ultrasound, MRI physics, MR imaging, properties of MRI; Image enhancement: contrast enhancement, denoising, deblurring, edge detection, derivatives and Fourier theory, anisotropic diffusion; Image registration: correlation, least squares, transformbased registration, joint entropy, mutual information, binning discontinuities, registration optimization, registration by clustering, ensemble registration, gaussian mixture models; Image segmentation: region growing, k-means clustering, snakes, introduction to level sets, speed functions, multi-atlas fusion-based segmentation; Medical image reconstruction: theory of MRI reconstruction, MRI motion compensation, algebraic CT reconstruction, CT filtered back-projection	
11.	**Textbook(s):** 1. Prince J L and Links J M, *Medical Imaging Signals and Systems*, Pearson (2010). 2. Suetens P, *Fundamentals of Medical Imaging*, Cambridge University Press (2009).	
12.	**Reference(s):** 1. Birkfellner W, *Applied Medical Image Processing: A Basic Course*, CRC Press (2014). 2. Gonzalez R C and Woods R E, *Digital Image Processing,* Pearson (2016). 3. Nishimura D, *Principles of Magnetic Resonance Imaging*, Stanford University Press (2010).	