

1.	Title of the course	Principles of Computerized Tomographic Imaging
2.	Course number	EE571L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Electrical Engineering
6.	Proposed by	Gorthi VRMS Subrahmanyam
7.	Prerequisite	CoT
8.	<b>Course Objective(s):</b> To introduce the principles of Computerized Tomographic (CT) image acquisition and image reconstruction. To analyze the image quality and common artifacts in CT imaging.	
9.	<b>Course Content:</b> Introduction to medical imaging: imaging basics, energy interaction with tissue, medical imaging modalities; Introduction to CT: X-ray generation, detectors, X-ray interaction with tissue, photoelectric effect and Compton scattering, attenuation physics, Beer-Lambert's law, principles of CT, generations of CT scanners, axial and helical acquisition, Radon transform, sinogram generation; CT image reconstruction: Fourier slice theorem, filter back projection techniques, algebraic reconstruction techniques, Simultaneous Iterative Reconstructive Technique (SIRT), Simultaneous Algebraic Reconstruction Technique (SART); CT image quality: modulation transfer function, slice sensitivity profile, Hounsfield units, window width and level adjustments, contrast-to-noise ratio, imaging dose, subjective and objective image evaluation; Artifacts in CT imaging: photon starvation, streak artifacts, beam hardening, view and channel aliasing artifacts, tube spits, bad detector channels, pinwheel artifacts, metal artifacts, motion artifacts; Artifact reduction methods: adaptive filtering, non-local means filtering, interpolation methods.	
10.	<b>Textbook(s):</b> 1. Kak A C and Slaney M, Principles of Computerized Tomographic Imaging, Society for Industrial and Applied Mathematics (2001).	
11.	<b>Reference(s):</b> 1. Herman G T, Fundamentals of Computerized Tomography: Image Reconstruction from Projections, 2nd Edition, Springer London (2009). 2. Suetens P, Fundamentals of Medical Imaging, 3rd Edition, Cambridge (2017). 3. Prince J L and Links J, Medical Imaging Signals and Systems, Pearson (2006).	