

2.	Mittermeier, R. A., N. Meyers, P.R. Gil and C. G. Mittermeier 2000. Hotspots: Earth's Biologically richest and most endangered Terrestrial Ecoregions. Cemex/ Conservation International, USA.
3.	Gaston, K. J. 1996. Biodiversity: Biology of numbers and Difference. Blackwell.

## PRINCIPLE OF IMAGING PROCESSING IN MEDICINE

**Details of course: -**

Course Title	Course Structure			Pre-Requisite
	L	T	P	
<b>Principle Of Imaging Processing in Medicine(BT344)</b>	03	01	00	Nil

**Course Objective:** To understand the principle of image processing and its use in medicine.

### **Course Outcome (CO):**

- 1 Understanding the principles, configurations, and reconstruction techniques of CT scanners, including the evaluation of image quality and clinical applications.
- 2 Comprehend the principles of photography and radiographic film imaging, including film sensitometry, image quality factors, and special imaging techniques.
- 3 Explore the principles and techniques of image enhancement and processing in both spatial and frequency domains, including color image processing and various image formats.
- 4 Analyze the principles and specific designs of fluoroscopic and angiographic imaging systems, including digital fluoroscopy and digital subtraction angiography.
- 5 Understand the principles of radiotherapy, including dose measurement, treatment planning, and safety protocols for clinical applications.

S.No.	Content	Contact Hours
1.	<b>Computed Tomography:</b> Principle of Computed tomography Scanner configurations/generations, CT system: Scanning unit(gantry), detectors, data acquisition system, spiral CT, scanner parameters, CT Number Reconstruction techniques, Radon Transform, Filtered Back projection, Fourier Reconstruction Technique, Iterative reconstruction Technique, Image quality and artifacts, Clinical applications of CT Multi-detector computed tomography (MDCT), Flat panel detectors CT-Angiography	8

2.	<b>Photography and film image:</b> Principle of photography and radiographic film image, film sensitometry, information content of an image, image quality factors (resolution, contrast, noise), Special imaging techniques: Cineradiography, cinefluorography, stereoscopic radiography, magnification radiography, microradiography, neutron radiography. Basics of Image processing: Image acquisition, Processing, communication, display, Electromagnetic Spectrum, Visual perception, structure of the human eye, image formation in the eye, uniform and Non-Uniform Sampling, Quantization, Image formats Image Enhancement: Spatial Domain-Point processing techniques, histogram processing, Neighborhood processing, Frequency Domain techniques- 2D-DFT, Properties of 2 D-DFT, Low pass, High pass, Noise removal, Homomorphic filters, Basics of Color image processing	8
3.	Fluoroscopy and angiography: Fluoroscopic imaging system, principle, specific system design. Digital fluoroscopy-c-arm system. Digital subtraction angiography (DSA), digital subtraction programming.	9
4.	Radiation therapy: Radiotherapy principles, dosage data for clinical applications (ISODOSE charts), radiation therapy planning, collimators and beam direction devices, dose measurement and treatment planning, tele isotope units. Safety protocols & protection.	9
5.	Infra-red Imaging: Physics of thermography, Imaging systems, clinical thermography, liquid crystal thermography, Image Compression: Fundamentals of Image compression models, Lossless Compression- RLE, Huffman, LZW, Arithmetic coding techniques Lossy Compression- IGS coding, Transform coding, JPEG, Predictive Coding.	8
<b>Total</b>		<b>42</b>

**Books: -**

S.No.	Name of Books/ Author/Publisher
16.	Digital Image Processing, Gonzalez and Woods- Pearson Education
17.	Fundamentals of Digital Image Processing, A.K. Jain –P.H.I.
18.	Digital Image Processing and Analysis, Chanda Majumder- Printice Hall India.
19.	Digital Image Processing and Computer Vision, Sonka, Hlavac,Boyle- Cenage learning.
20.	Digital Image Processing, William Pratt- John Wiley

**GENOMICS AND PROTEOMICS**

**Details of course:-**

Course Title	Course Structure			Pre-Requisite
	L	T	P	