



St. Xavier's College – Autonomous
Mumbai

Syllabus
For 5th Semester Applied Component in **PHYSICS**
(June 2018 onwards)

T.Y. B.Sc. PHYSICS

Course: SPHYDIPAC5

Title: Digital Image Processing-I

Number of lectures: 60

Learning objective: To study the mathematical modeling of digital images

UNIT I (15 LECTURES)

Introduction(2lec.): What Is Digital Image Processing?The Origins of Digital Image Processing, Gamma-Ray ImagingX-Ray Imaging, Imaging in the Ultraviolet Band, Imaging in the Visible and Infrared Bands, Imaging in the Microwave Band, Imaging in the Radio Band, Examples in which Other Imaging Modalities Are Used, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Problems

THIS CHAPTER IS ONLY OVERVIEW (not for exam)

Digital image fundamentals (3lec.): Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing, Problems

Image enhancements in spatial domain (8lec.): Background, Some Basic Intensity, Transformation Functions, Histogram Processing, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods, Problems

UNIT II (15 LECTURES)

Image enhancements in frequency domain: Background, Preliminary Concepts, Sampling and the Fourier Transform of Sampled Functions, The Discrete Fourier Transform (DFT) of One Variable Extension to Functions of Two Variables, Some Properties of the 2-D Discrete Fourier Transform

The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters, Selective Filtering, Implementation Problems

UNIT –III (15 LECTURES)

Image restoration: Image Restoration and Reconstruction, A Model of the Image, Degradation/Restoration Process, Noise Models, Spatial and Frequency Properties of Noise, Some Important Noise Probability Density Functions, Periodic Noise, Estimation of Noise Parameters Restoration in the Presence of Noise Only-Spatial Filtering, Mean Filters, Order-Statistic Filters Adaptive Filters, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter Image Reconstruction from Projections, Problems

Unit IV(15 lectures)

Color image processing: Color Fundamentals, Color Models, Pseudo-color Image Processing Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening Image Segmentation Based on Color, Noise in Color Images, Color Image Compression, Problems

Reference:

1. Digital image processing, third edition, -Gonzalez and woods
 2. Digital image processing, third edition, -A. K. Jain
 3. Digital image processing using MATLAB, -Gonzalez and woods
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C.I.A.:

Problem Solving / Multiple Choice Questions /Assignments/ Literature Review / Field trips

Practicals:-

T.Y.BSc Digital Image processing-I COURSE: S.PHY.DIP.AC.5.PR

Digital processing of given images using software
Tutorials on image processing
Projects