



राष्ट्रीय प्रौद्योगिकी संस्थान जमशेदपुर NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR

(An Institution of National Importance under MHRD, Government of India)

International Credit Mobility of the Erasmus+ Program, 2020-2023 Course Handout

Course Name: *Image Processing and Its Different Applications in Engineering*

Instructor: *Dr. Koushendra Kumar Singh, NIT Jamshedpur, India*

Course Objective: To explore students' ability in different techniques of Image Processing and their engineering applications.

References:

1. Digital Image Processing: Rafael C. Gonzalez, Richard E. Woods, Third Edition, Pearson Education,
2. Fundamentals of digital image processing, Anil K. Jain, Prentice Hall
3. Digital Image Processing by William K Pratt

Pre-Requisites:

1. Basic concept of signal processing, High school mathematics, C/C++ programming skill, Probabilistic Methods, Basics of calculus

Course Plan: Lecture hall: **137Π39** (Science building)

Serial No.	Topics	No. of Lectures	Date	Hour
1	Introduction to Image Processing Image Processing and related field, Fundamental Steps in DIP, Components of an Image Processing System	1-2	Wednesday 5/10/2022	13-15
2	Classification of Image Processing operations Details of Image processing operations, , basic relationship, distance metrics, Arithmetic Operations, Logical operation, Set operation, Statistical Operation, Sampling and Quantization	2-3	Friday 7/10/2022	13-16
3	Intensity Transforms and Spatial filtering Backgrounds, basics of intensity transforms and spatial filtering, Intensity transform function, Image negative, Log transformation, Power-law transformation, piecewise linear transformation, Histogram processing, Histogram Equalization, Histogram Matching, Local Histogram Processing, Histogram statics for image enhancement, Smoothing spatial filters, sharpening spatial filters, The Laplacian, The Gradient, Unsharp masking	4-5	Monday 10/10/2022	11-13
4	Filtering in the frequency domain Fourier Transforms and properties, Convolution, Correlation, 2-D sampling, Discrete Cosine Transform, Frequency domain filtering	6-7	Wednesday 12/10/2022	13-15
5	Applications of Image Processing Image Processing in Medical Imaging, Wood Applications, Multiphase Flow, Satellite Imaging	8-10	Friday 14/10/2022	13-16