Nirma University
School of Technology, Institute of Technology
B. Tech (Electronics and Instrumentation Engineering)

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Course Code	**2EIDE59**
Course Title	**Image Processing and its Applications**

Course Outcomes (CO):
At the end of the course, students will be able to -

- illustrate the fundamentals of image processing techniques
- illustrate and apply the feature detection and tracking algorithms
- apply the vision based algorithms in industrial applications

Syllabus	**Teaching Hours**
UNIT 1: Introduction	**01**
Introduction to Image Processing	
UNIT 2: Digital image fundamentals	
Elements of visual perception, light and the electromagnetic spectrum, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels.	**03**
UNIT 3: Image enhancement	
Some basic gray level transformations, histogram processing, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing spatial filters, sharpening spatial filters, smoothing frequency-domain filters, sharpening frequency domain filters.	**06**
UNIT 4: Morphological image processing and segmentation	
Dilation and erosion, opening and closing, the hit-or-miss transformation, thinning, thickening, region growing, region shrinking, detection of discontinuities, edge linking and boundary detection, thresholding, region-based segmentation.	**07**

UNIT 5: Object representation, description and recognition **07**

Chain codes, polygonal approximations, signatures, boundary segments, skeletons, boundary descriptors, regional descriptors, patterns and pattern classes, recognition based on decision-theoretic methods, structural methods.

UNIT 6: Applications & case studies **06**

Industrial applications of image processing, patterns classification, case studies.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:
Laboratory work will consist of minimum 10 experiments based on the above syllabus.

References:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Pearson Education India.
2. A. Rosenfeld and A.C. Kak, Digital Picture Processing, Academic Press.
3. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing Using MATLAB, PHI Publication.