Nirma University

Institute of Technology

B. Tech (Instrumentation and Control Engineering)

Semester: V/VI

L	T	P	C
3	0	0	3

(Open Elective for all)

Course Code	2ICOE03
Course Title	Pattern Recognition and Image Analysis

Course Outcomes (COs):

At the end of the course, students will be able to –

1. illustrate the fundamentals of image processing techniques
2. apply the feature detection and tracking algorithms
3. explain supervised and unsupervised machine learning algorithms
4. design various machine learning algorithms to solve real-world applications problems

Syllabus **Teaching Hours**

UNIT 1: Introduction **01**

Introduction to image processing and pattern recognition

UNIT 2: Image enhancement **06**

Some basic gray level transformations, histogram processing, filtering

UNIT 3: Morphological image processing and segmentation **08**

Dilation and erosion, opening and closing, the hit-or-miss transformation, thinning, thickening, edge linking and boundary detection, thresholding, region-based segmentation

UNIT 4: Object representation and description **09**

Chain codes, polygonal approximations, signatures, boundary segments, skeletons, boundary descriptors, regional descriptors

UNIT 5: Regression techniques **04**

Basic concepts and applications of Regression, Simple Linear & Multiple Regression, Gradient Descent, Hyper-parameters tuning, Evaluation Measures for Regression Techniques

UNIT 6: Classification techniques **15**

Logistic regression, Naïve Bayes Classification, K-Nearest Neighbors, Classification Trees, Support Vector Machines, Artificial Neural Networks, Convolution Neural Network

UNIT 7: Applications & case studies **02**

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.

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. A.K.Jain, Fundamentals of Digital Image Processing", PHI Publications.
4. K R Castleman, Digital Image Processing Pearson Education India.
5. Tom Mitchell, Machine Learning, TMH
6. C.Bishop, Pattern Recognition and Machine Learning, Springer
7. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, The MIT Press.

L= Lecture, T= Tutorial, P= Practical, C = Credit