| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DC | CSD518 | **PATTERN RECOGNITION** | 3 | 0 | 0 | 9 |

| **Course Objective** |
|---|
| To train the students about the key concepts and enable them to apply them in real life applications in various related fields like AI, Multi-biometric processing for security, authenticity, data and knowledge engineering |
| **Learning Outcomes** |
| The knowledge and concepts in these topics are likely to help the students do better in future in job as well as in higher studies. |

| Unit No. | Topics to be Covered | Lecture Hours | Learning Outcome |
|---|---|---|---|
| 1 | Introduction, fundamentals and definitions | 2 | The students will be made familiar what this subject is for and what are the major application areas |
| 2 | Features: types and traits, scaling, ordering, measurements , normalization, invariance, dimensionality reduction of feature space, dimensionality reduction by feature selection,<br>PCA,KPCA, ICA, MDA | 10 | This fundamental part will teach how to handle data and extract features so as to proceed with finding, locating and<br>quantifying patterns in the data set |
| 3 | Bayesian decision theory; | 6 | This important part will teach them tro handle the problem of pattern recognition from a statistical and probabilistic point of view |
| 4 | Parameter estimation: MLE, LSE | 5 | This part will teach the student to find/predict the underlying statistical process associated with pattern classification and will learn the popular techniques for estimation of parameters using maximum likelihood and leat square estimation techniques |
| 5 | Parameter free methods:KNN, Clustering, | 5 | The students will learn about popular techniques of clustering - an unsupervised technique extensively used in pattern recognition tasks |
| 6 | special classifiers: linear regression, LDA, SVM, deep learning, CNN; | 10 | The students will learn some of the very widely used and popular techniques in pattern recognition and can apply them in real life problems |
| 7 | Classification with nominal features : decision tree, random forest; classifier independent concepts. | 4 | The students will teach some more about some mathematical concepts |

**Text Books:**


1. Pattern Recognition and Machine Learning Christopher M Bishop, Springer
2. Pattern recognition by Sergios Theodoridis, Konstantinos Koutroumbas, Academic Press


**Reference Books:**


A Probabilistic Theory of Pattern Recognition by Luc Devroye, László Györfi, Gábor Lugosi , Springer Verlag.