List of New Course(s) Introduced

Department : Information Technology

Programme Name : B.Tech.

Academic Year : 2024-25

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	ITUETT1	MACHINE LEARNING
02.	ITUELT1	MACHINE LEARNING LAB
03.	ITUETK1	DIGITAL IMAGE PROCESSING

Academic Year : 2024-25

School : School of Studies – Engineering & Technology

Department : Information Technology

Date and Time : 12-07-2024, 02:00PM

Venue : Smart Class Room – G-14 [Hybrid Modes]

Minutes of Meeting Dated 12/07/2024

A Meeting of BoS in Information Technology was held today on 12/07/2024 at 02.00 PM. The Following Members have attended the meeting.

1. Dr. Rohit Raja, BoS Chairman, Dept. of Information Technology, SoS-E&T, GGV.
2. Prof. Apurva Desai, Professor, Veer Narmad Sauth Gujrat University
3. Ms. Ashwini Jha, Software Developer, Persistent
4. Mr. Pankaj Chandra, Member, BoS, Dept. of IT, SoS-E&T, GGV.
5. Mr. Agnivesh Pandey, Invited Member
6. Mr. Suhel Ahamed, Invited Member
7. Mr. Deepak Kant Netam, Invited Member
8. Mr. Anand Prakash Rawal, Invited Member
9. Dr. Amit Kumar Dewangan, Invited Member
10. Mrs. Aradhana Soni, Invited Member

The Head of Department welcomed all members of BoS in the meeting and then the following agenda was discussed in the meeting.

1. The Scheme and Syllabus of B.Tech. IT – 3rd Year NEP (5th and 6th Semester) 2024-25 has been discussed and approved.
2. The subject code can be changes as per university regulation/ policy time to time.

The following courses were revised in the B.Tech. IT – 3rd Year NEP (5th and 6th Semester) 2024-25:

- DATABASE MANAGEMENT SYSTEMS (ITUETT2) - B.Tech. 5th Semester
- DATABASE MANAGEMENT SYSTEMS (ITUELT2) - B.Tech. 5th Semester
- MICROPROCESSOR & MICROCONTROLLER LAB (ITUFLT1) - B.Tech. 6th Semester

The following new courses were introduced in B.Tech. IT – 3rd Year NEP (5th and 6th Semester) 2024-25:

- MACHINE LEARNING (ITUETT1) - B.Tech. 5th Semester
- MACHINE LEARNING LAB (ITUELT1) - B.Tech. 5th Semester
- MINI PROJECT - II (ITUEPV1) - B.Tech. 5th Semester
- DIGITAL IMAGE PROCESSING (ITUETK1) - B.Tech. 5th Semester
- MOOC COURSE – I (ITUFTO1) - B.Tech. 6th Semester

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❖ PROJECT (ITUFPV1) - B.Tech. 6th Semester

The meeting ended with a vote of thanks by Head of the Department.

Dr. Rohit Raja
BoS Chairman

(Consent Taken Through Mail)
Prof. Apurva Desai Professor
Veer Narmad Sauth Gujrat University

(Consent Taken Through Mail)
Ms. Ashwini Jha
Software Developer
Persistent

Mr. Pankaj Chandra
Member, BoS

Mr. Agnivesh Pandey
Invited Member

Mr. Sahil Ahamed
Invited Member

Mr. Deepak Kant Netam
Invited Member

Mr. Anand Prakash Rawal
Invited Member

Dr. Amit Kumar Dewangan
Invited Member

Mrs. Aradhana Soni
Invited Member

Scheme and Syllabus

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER V
EFFECTIVE FROM SESSION 2024-25 (NEP)

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	ITUETT1	MACHINE LEARNING	3	0	0	40	60	100	3
2	ITUETT2	DATABASE MANAGEMENT SYSTEMS	3	1	0	40	60	100	4
3	ITUETT3	FORMAL LANGUAGE & AUTOMATA THEORY	3	0	0	40	60	100	3
4	ITUETKX	DEPARTMENT ELECTIVE-III	3	0	0	40	60	100	3
5	ITUETKX	DEPARTMENT ELECTIVE-IV	3	0	0	40	60	100	3
PRACTICAL									
1	ITUELT1	MACHINE LEARNING LAB	0	0	3	25	25	50	1.5
2	ITUELT2	DATABASE MANAGEMENT SYSTEMS LAB	0	0	3	25	25	50	1.5
3	ITUEPV1	MINI PROJECT - II	0	0	4	50	50	100	2
TOTAL CREDITS									21

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF DEPARTMENT ELECTIVE-III

1	ITUETK1	DIGITAL IMAGE PROCESSING
2	ITUETK2	SOFTWARE TESTING & QUALITY MANAGEMENT
3.	ITUETK3	SOFT COMPUTING

LIST OF DEPARTMENT ELECTIVE-IV

1	ITUETK4	WIRELESS SENSOR NETWORK
2	ITUETK5	HUMAN COMPUTER INTERFACE
3.	ITUETK6	NETWORK SECURITY

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VI
EFFECTIVE FROM SESSION 2024-25 (NEP)

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	ITUFTT1	MICROPROCESSOR & MICROCONTROLLER	3	0	0	40	60	100	4
2	ITUFTT2	COMPUTER NETWORKS	3	0	0	40	60	100	3
3	ITUFTKX	DEPARTMENT ELECTIVE-V	3	0	0	40	60	100	3
4	ITUFTKX	DEPARTMENT ELECTIVE-VI	3	0	0	40	60	100	3
5	ITUFTO1	MOOC COURSE - I	3	0	0	-	-	100	3
PRACTICAL									
1	ITUFLT1	MICROPROCESSOR & MICROCONTROLLER LAB	0	0	3	25	25	50	1.5
2	ITUFLT2	COMPUTER NETWORKS LAB	0	0	3	25	25	50	1.5
3	ITUFPV1	PROJECT	0	0	4	50	50	100	2
TOTAL CREDITS									**21**

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF DEPARTMENT ELECTIVE-V

1	ITUFTK1	COMPILER DESIGN
2	ITUFTK2	DISTRIBUTED SYSTEM
3.	ITUFTK3	COMPUTER GRAPHICS

LIST OF DEPARTMENT ELECTIVE-VI

1	ITUFTK4	GRID & CLOUD COMPUTING
2	ITUFTK5	OBJECT ORIENTED ANALYSIS & DESIGN
3.	ITUFTK6	DATA MINING

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
ITUETT1	3	0	0	3 HOURS	40	60	3

MACHINE LEARNING

Course Objectives:
Students must be able to:

1. Understand the concept of learning and candidate elimination algorithms.
2. Understand the concept of perception and explore on Genetic algorithms
3. Explore on computational learning methods
4. Explore on instance based and case based learning.
5. Explore inductive learning and Reinforcement Learning methods

UNIT I

Introduction: Representation and Learning: Feature Vectors, Feature Spaces, Feature Extraction and Feature Selection, Learning Problem Formulation
Types of Machine Learning Algorithms: Parametric and Nonparametric Machine Learning Algorithms, Supervised, Unsupervised, Semi-Supervised and Reinforced Learning.
Preliminaries: Over fitting, Training, Testing, and Validation Sets, The Confusion Matrix, Accuracy Metrics: Evaluation Measures: SSE, RMSE, R2, confusion matrix, precision, recall, F-Score, Receiver Operator Characteristic (ROC) Curve, Unbalanced Datasets, some basic statistics: Averages, Variance and Covariance, The Gaussian, the bias-variance tradeoff.

UNIT II

Supervised Algorithms
Regression: Linear Regression, Logistic Regression, Linear Discriminant Analysis.
Classification: Decision Tree, Naïve Bayes, K-Nearest Neighbors, Support Vector Machines, evaluation of classification: cross validation, hold out.

UNIT III

Ensemble Algorithms: Bagging, Random Forest, Boosting
Unsupervised Learning:
Cluster Analysis: Similarity Measures, categories of clustering algorithms, k-means, Hierarchical, Expectation-Maximization Algorithm, Fuzzy c-means algorithm.

UNIT IV

Neural Networks: Multilayer Perceptron, Back-propagation algorithm. Training strategies, Activation Functions, Gradient Descent For Machine Learning, Radial basis functions, Hopfield network, Recurrent Neural Networks.
Deep learning: Introduction to deep learning. Convolutional Neural Networks (CNN), CNN Architecture, pre-trained CNN (LeNet, AlexNet).

UNIT V

Reinforcement Learning: overview, example: getting lost, State and Action Spaces, The Reward Function, Discounting, Action Selection, Policy, Markov decision processes, Q-learning, uses of Reinforcement learning

Applications of Machine Learning in various fields: Text classification, Image Classification, Speech Recognition.

TEXT BOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Second Edition (Chapman & Hall/Cre Machine Learning & Pattern Recognition) (2014)
2. Machine Learning, Tom Mitchell, McGraw-Hill Science/Engineering/Math; (1997).
3. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press (2017)
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer Series in Statistics, (2009).
5. Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer, (2006)
6. An Introduction to Pattern Recognition and Machine Learning, M Narasimha Murty, V Susheela Devi, IISc Press.
7. Uma N. Dulhare, Khaleel Ahmad, Khairol Amali Bin Ahmad, Machine Learning and Big Data: Concepts, Algorithms, Tools and Applications, Scrivener Publishing, Wiley, 2020.

Course Outcomes:

1. Extract features that can be used for a particular machine learning approach in various applications.
2. Compare and contrast pros and cons of various machine learning techniques and to get an insight when to apply particular machine learning approach.
3. Understand different machine learning types along with algorithms.
4. Understand how to apply machine learning in various applications.
5. Apply ensemble techniques for improvement of classifiers.

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SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
ITUELT1	0	0	3	3 HOURS	25	25	1.5

Machine Learning Lab

Course Objectives:
This course is designed to enable the students to:
1. Demonstration of different classifiers on different data.
2. Demonstrate ensembling of classifiers for solving real world problems.
3. Make use of real world data to implement machine learning models.

1. Basic Data Preprocessing

a) Installation of python environment/Anaconda IDE for machine learning: installing python modules/Packages like scikit-learn, Keras and Tensorflow etc.

b) Programs involving pandas, Numpy and Scipy libraries.

2. Programs for classification

1. Build models using linear regression and logistic regression and apply it to classify a new instance.
2. Write a program to demonstrate the following classifiers. Use an appropriate data set for building the model. Apply the model to classify a new instance.
    a. Decision tree
    b. K nearest neighbour
    c. Naïve bayes
    d. Support vector machine

3. Demonstration of clustering algorithms using

1. k-means
2. Hierarchical algorithms (agglomerative etc).
3. Interpret the clusters obtained.
4. Demonstrate ensemble techniques like boosting, bagging, random forests etc.
5. Build a classifier, compare its performance with an ensemble technique like random forest.
6. Evaluate various classification algorithms performance on a dataset using various measures like True Positive rate, false positive rate, precision, recall etc.
7. Demonstrate GA for optimization (minimization or maximization problem).
8. Case study on supervised/unsupervised learning algorithm:
    a. Handwritten digits classification using CNN.
    b. Text classification using python libraries.

TEXT BOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Second Edition (Chapman & Hall/Cre Machine Learning & Pattern Recognition) (2014)
2. Machine Learning, Tom Mitchell, McGraw-Hill Science/Engineering/Math; (1997).
3. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press (2017)
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Second Edition, Springer Series in Statistics. (2009).
5. Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer. (2006)
6. An Introduction to Pattern Recognition and Machine Learning, M Narasimha Murty, V Susheela Devi, IISc Press.
7. Uma N. Dulhare, Khaleel Ahmad, Khairol Amali Bin Ahmad, Machine Learning and Big Data: Concepts, Algorithms, Tools and Applications, Scrivener Publishing, Wiley, 2020.

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Course Outcomes:

Students must be able to:

1. Apply machine learning algorithms: dataset preparation, model selection, model building etc.
2. Evaluate various Machine Learning approaches.
3. Use scikit-learn, Keras and Tensorflow to apply ML techniques.
4. Design and develop solutions to real world problems using ML techniques.
5. Apply unsupervised learning and interpret the results.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
ITUETK1	3	0	0	3 HOURS	40	60	3

DIGITAL IMAGE PROCESSING

Course Objectives:

1. Cover the basic theory and algorithms that are widely used in digital image processing.
2. Expose students to current technologies and issues that are specific to image processing systems.
3. Develop hands-on experience in using computers to process images.
4. Develop critical thinking about shortcomings of the state of the art in image processing.

Unit I: Introduction

Image formation model, Spatial & Gray level resolution, Image enhancement in special domain: Piecewise transformation functions, Histogram equalization, Histogram specification, image averaging, spatial filters- smoothing and sharpening. Laplacian filter, Canny edge detector.

Unit II: Image Enhancement in Frequency Domain & Image segmentation:

2D discrete Fourier transform & its inverse, filtering in frequency domain, Ideal & Gaussian low pass filters, High pass filtering, FFT, Line detection, Edge detection, Edge linking & boundary detection, Thresholding, Region based segmentation.

UNIT III: Morphological Image Processing

Logic operations involving binary image, Dialation & Erosion, Opening & Closing, Applications to Boundary extraction, region filling, connected component extraction.

UNIT IV: Image compression

Coding redundancy- Huffman coding, LZW coding, run length coding, Lossy compression- DCT, JPEG, MPEG, video compression.

UNIT V: Image representation & 3D

Boundary descriptors, Shape numbers, Texture, Projective geometry, Correlation based and feature based stereo correspondence, shape from motion, optical flow.

Text Book

1. Ganzalez and Woods, Digital Image Processing, Pearson education.
2. Sonka and Brooks, Image Processing, TSP ltd,

References Book: -

1. Jain and Rangachar, Machine Vision, MGH.
2. Schalkoff, Digital Image Processing, John Wiley and sons.

Course Outcomes:

After successful completion of the course, student will be able to

1. Describe, analyze and reason about how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.
2. Design and analysis. Analyze and implement image processing algorithms.
3. Apply principles and techniques of digital image processing in applications related to digital imaging system.