JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

Minor in COMPUTING SKILLS

Course Structure & Syllabus (R-25 Regulations)

Applicable from AY 2025-2026 Batch

S.No	Year/ Semester	Theory (3 credits)	Lab (1 Credit)	Total Credits
1	II Year II Sem.	Full Stack Development	Full Stack Development Lab	4
2	III Year I Sem.	Prompt Engineering	--	3
3	III Year II Sem.	Data Analytics	Data Analytics Lab	4
4	IV Year I Sem.	Electives 1. Robotic Process Automation 2. Deep Learning for Computer Vision 3. Data Visualization 4. Natural Language Processing 5. Soft Computing	--	3
5	IV Year I Sem.	Project/ Experiential Learning	--	4
			Total Credits	**18**

FULL STACK DEVELOPMENT

B.Tech. II Year II Sem.

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Course Objectives:

- Students will become familiar to implement fast, efficient, interactive and scalable web applications using run time environment provided by the full stack components.

Course Outcomes:

1. Understand Full stack components for developing web application.
2. Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.
3. Use MongoDB data base for storing and processing huge data and connects with NodeJS application.
4. Design faster and effective single page applications using Express and Angular.
5. Create interactive user interfaces with react components.

UNIT-I

Introduction to Full Stack Development:

Understanding the Basic Web Development Framework- User, Browser, Webserver, Backend Services, Full Stack Components - Node.js, MongoDB, Express, React, Angular. Java Script Fundamentals, NodeJS- Understanding Node.js, Installing Node.js, Working with Node Packages, creating a Node.js Application, Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks

UNIT-II

Node.js:

Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Accessing the File System from Node.js- Opening, Closing, Writing, Reading Files and other File System Tasks. Implementing HTTP Services in Node.js- Processing URLs, Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients. Using Additional Node.js Modules-Using the os Module, Using the util Module, Using the dns Module, Using the crypto Module.

UNIT-III

MongoDB:

Need of NoSQL, Understanding MongoDB, MongoDB Data Types, Planning Your Data Model, Building the MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections, Adding the MongoDB Driver to Node.js, Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and Manipulating Collections

UNIT-IV

Express and Angular:

Getting Started with Express, Configuring Routes, Using Requests Objects, Using Response Objects. Angular: importance of Angular, Understanding Angular, creating a Basic Angular Application, Angular Components, Expressions, Data Binding, Built-in Directives, Custom Directives, Implementing Angular Services in Web Applications.

UNIT-V

React:

Need of React, Simple React Structure, The Virtual DOM, React Components, Introducing React Components, Creating Components in React, Data and Data Flow in React, Rendering and Life Cycle Methods in React, Working with forms in React, integrating third party libraries, Routing in React.

TEXT BOOKS:

1. Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular Web Development, 2nd Edition, Addison-Wesley,2019.
2. Mark Tielens Thomas, React in Action, 1st Edition, Manning Publications.

REFERENCE BOOKS:

1. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress,2019.
2. Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', 1st edition, Apress, 2018.
3. Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications Using React and Redux, 2nd edition, Addison-Wesley Professional, 2018.

FULL STACK DEVELOPMENT LAB

B.Tech. II Year II Sem.

L	T	P	C
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Course Objectives:

- Introduce fast, efficient Interactive and scalable web applications using run time environment provided by tne full stack components.

Coupe Outcomes:

- Design flexible and responsive Web applications using Node JS, React, Express and Angular.
- Perform CRUD operations with MongoDB on huge amount of data.
- Develop real time applTca8ons using reset components.
- Use serious full stack modules to handle http requests and responses.

List of Experiments

1. Create an application to setup node JS environment and display “Hello World”.
2. Create a Node JS application for user login system.
3. Write e Node JS program to perform read, write and other operations on e file.
4. Write Node JS program to read form data from query string and generate response using **NodeJS**
5. Create a food delivery website where user6 can order food from a particular restaurant listed in the website for handling hnp requests and responses using NodeJ8.
6. Implement a program with basic commands on databases and collections using MongoDB.
7. Implement CRUD operations on the given dataset using MongoDB.
8. Perform Count. Limit, Sort, and Skip operations on the given collections using MongoDB.
9. Develop an angular JS form to apply CSS and Events.
10. Develop a Job Registration form and validate It using angular JS.
11. Write an angular JS application e access JOON file data of an employee from a server using $httg service.
12. Develop a web application to manage student information using Express and Angular JS.
13. Write e program to create a simple calculator Application using Read JS.
14. Write a program to create a voting application using React JR
15. Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view The available number of days using react application.
16. Build a music store application using react components end provide routing among the web
17. Create a react application for an online store which consist of registration, login, product information pages and implement routing to navigate Through these pages.

TEXT BOOK:

1. Brad Dayley. Brendan Dayley. Caleb Dayley., Nodejs. MongoDB and Angular Web Development. 2'' Edition. Addison-Wesley.201B.
2. Mark Tielens Thomas., React in Acéon, 1• Edition, Manning Publications.

REFERENCE BOOKS:

1. Vasan Subramanian, Pro MERN Steck. Full Stack Web App Development with Mongo. Express, Reset, and Node, 2 Edition, Aprees,2018.
2. Chñs Nortttwood, The Full Stack Developer. Your Essential Guide to be Everyday skills Expected of a Modem Full Stack Web Developer’, 1 edition. Apress. 2018.
3. Brad Green & Seshedd. Angular JS. 1st Edition. O’ Riley Media, 2013.
4. Kirupa Chinnathambi, Learning Reset: A Hands-on Guide to Building Web Applications Using React and Redux, 2 edition, AddIso>Wesley Professional. 2018

PROMPT ENGINEERING

B.Tech. III Year I Sem.

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Course Objectives:

- To introduce the principles and techniques of effective prompt engineering for generative AI models.
- To understand the architecture, capabilities, and evolution of large language models such as GPT-3.5, GPT-4, Gemini, and LLaMA.
- To explore standard practices in structured and unstructured text generation using tools like ChatGPT.
- To apply chunking, tokenization, and formatting techniques for improving text generation and manipulation.
- To understand the role of embeddings, vector databases (FAISS, Pinecone), and Retrieval-Augmented Generation (RAG) in modern NLP systems.

Course Outcomes: After completion of the course, the student should be able to

CO-1: Explain and apply the core principles of prompt engineering for guiding generative AI outputs effectively.

CO-2: Describe the underlying architecture and functionality of state-of-the-art large language models (LLMs).

CO-3: Generate and manipulate structured outputs (JSON, YAML, CSV) using ChatGPT with advanced prompting techniques.

CO-4: Implement text chunking, tokenization, and format control using tools like SpaCy, Tiktoken, and Python.

CO-5: Utilize vector databases such as FAISS and Pinecone in Retrieval-Augmented Generation (RAG) pipelines for efficient information retrieval.

UNIT – I: Fundamentals and Principles of Prompting

Overview of the Five Principles of Prompting: Give Direction, Specify Format, Provide Examples, Evaluate Quality, Divide Labor.

UNIT – II: Introduction to Large Language Models for Text Generation

What Are Text Generation Models, Vector Representations: The Numerical Essence of Language, Transformer Architecture: Orchestrating Contextual Relationships, Probabilistic Text Generation: The Decision Mechanism, Historical Underpinnings: The Rise of Transformer Architectures, OpenAI's Generative Pretrained Transformers, GPT-3.5-turbo and ChatGPT, GPT-4, Google's Gemini, Meta's Llama and Open Source.

UNIT – III: Standard Practices for Text Generation with ChatGPT- Part-A

Generating Lists, Hierarchical List Generation, When to Avoid Using Regular Expressions, Generating JSON, YAMLFiltering YAML Payloads, Handling Invalid Payloads in YAML, Diverse Format Generation with ChatGPT, Mock CSV Data, Universal Translation Through LLMs, Ask for Context, Text Style Unbundling, Identifying the Desired Textual Features, Generating New Content with the Extracted Features, Extracting Specific Textual Features with LLMs.

UNIT – IV: Standard Practices for Text Generation with ChatGPT- Part-B

Chunking Text, Benefits of Chunking Text, Scenarios for Chunking Text, Poor Chunking Example, Chunking Strategies, Sentence Detection Using SpaCy, building a Simple Chunking Algorithm in Python, Sliding Window Chunking, Text Chunking Packages, Text Chunking with Tiktoken, Encodings, Understanding the Tokenization of Strings.

UNIT – V: Vector Databases with FAISS and Pinecone

Retrieval Augmented Generation (RAG), Introducing Embeddings, Document Loading
Memory Retrieval with FAISS, RAG with LangChain, Hosted Vector Databases with Pinecone, Self-Querying, Alternative Retrieval Mechanisms.

TEXTBOOK:

1. Phoenix J, Taylor M. Prompt engineering for generative AI. " O'Reilly Media, Inc."; 2024 May 16.

REFERENCES:

1. Tunstall L, Von Werra L, Wolf T. Natural language processing with transformers. " O'Reilly Media, Inc."; 2022 Jan 26.
2. Foster D. Generative deep learning. " O'Reilly Media, Inc."; 2022 Jun 28.

DATA ANALYTICS

B.Tech. III Year II Sem.

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Prerequisites

1. A course on “Database Management Systems”.
2. Knowledge of probability and statistics.

Course Objectives:

1. To explore the fundamental concepts of data analytics.
2. To learn the principles and methods of statistical analysis
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. To understand the various search methods and visualization techniques.

Course Outcomes: After completion of this course students will be able to

1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. To carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, TreeBuilding – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:

1. Student’s Handbook for Associate Analytics – II, III.

2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

DATA ANALYTICS LAB

B.Tech. III Year II Sem.

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Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Outcomes:

1. Understand linear regression and logistic regression
2. Understand the functionality of different classifiers
3. Implement visualization techniques using different graphs
4. Apply descriptive and predictive analytics for different types of data

List of Experiments:

1. Data Preprocessing
    a. Handling missing values
    b. Noise detection removal
    c. Identifying data redundancy and elimination
2. Implement any one imputation model
3. Implement Linear Regression
4. Implement Logistic Regression
5. Implement Decision Tree Induction for classification
6. Implement Random Forest Classifier
7. Implement ARIMA on Time Series data
8. Object segmentation using hierarchical based methods
9. Perform Visualization techniques (types of maps - Bar, Colum, Line, Scatter, 3D Cubes etc)
10. Perform Descriptive analytics on Healthcare data
11. Perform Predictive analytics on Product Sales data
12. Apply Predictive analytics for Weather forecasting.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCES:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

ROBOTIC PROCESS AUTOMATION

B.Tech. IV Year I Sem.

L	T	P	C
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Course Objectives:

- Introduce robotic process automation, techniques of automation using UIPath RPA tool.

Course Outcomes:

1. Understand the concepts of Robotic Process Automation.
2. Apply the flow chart mechanism in various calculations.
3. Applying UIPath tool for debugging process
4. Design system managing techniques.
5. Create application for process automation using UIPath tool.

UNIT I

Robotic Process Automation: Introduction**,** Scope and techniques of automation, Robotic process automation, Components of RPA, RPA platforms, About UiPath

UIPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator

UIPath Studio Projects, User interface

The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

UNIT II

Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control Flow, various types of loops and decision making

Data Manipulation: Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa

Unit III

Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder, When to use OCR, Types of OCR available, How to use OCR

Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management

Unit IV

Handling User Events and Assistant Bots: Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event

Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting

Unit V

Managing and Maintaining the Code: Project organization, nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files

Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and Managing updates

TEXT BOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition

REFERENCES:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition

DEEP LEARNING FOR COMPUTER VISION

B.Tech. IV Year I Sem.

L	T	P	C
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Course Objectives:

1. To introduce to the students to traditional computer vision topics
2. To apply deep learning methods to computer vision

UNIT-I

Introduction to deep leaning: Review of Deep Learning, Multi-layer Perceptrons Backpropagation Convolutional Neural Networks (CNNs): Introduction to CNNs; Evolution of CNN. Architectures: AlexNet, ZFNet, VGG, InceptionNets, ResNets, DenseNets.

Introduction to Image Formation: Capture and Representation; Linear Filtering, Correlation, Convolution, Visual Features and Representations: Edge, Blobs, Corner Detection; Scale Space and Scale Selection; SIFT, SURF; HoG, LBP, etc.

Visual Matching: Bag-of-words, VLAD; RANSAC, Hough transform; Pyramid Matching; Optical Flow

UNIT-II

Visualization and Understanding CNNs: Visualization of Kernels; Backprop-to-image/Deconvolution Methods; Deep Dream, Hallucination, Neural Style Transfer; CAM, Grad-CAM, Grad-CAM++; Recent Methods (IG, Segment-IG, SmoothGrad)

CNNs for Recognition, Verification, Detection, Segmentation: CNNs for Recognition and Verification (Siamese Networks, Triplet Loss, Contrastive Loss, Ranking Loss); CNNs Detection:

Background of Object Detection, R-CNN, Fast R-CNN, Faster R-CNN, YOLO, SSD, RetinaNet; CNNs for Segmentation: FCN, SegNet, U-Net, Mask-RCNN

Recurrent Neural Networks (RNNs): Review of RNNs; CNN + RNN Models for Video Understanding: Spatio-temporal Models, Action/Activity Recognition

UNIT-III

Introduction to Attention Models in Vision; Vision and Language: Image Captioning, Visual QA, Visual Dialog; Spatial, Transformers; Transforme, Networks

UNIT - IV

Deep Generative Models: Review of (Popular) Deep Generative Models: GANs, VAEs; Other Generative Models: PixelRNNs, NADE, Normalizing Flows, etc.

UNIT - V

Variants and Applications of Generative Models in Vision: Applications: Image Editing, Inpainting, Super resolution, 3D Object Generation, Security; Variants: CycleGANs, Progressive GANs, StackGANs, Pix2Pix, etc

Recent Trends: Zero-shot, One-shot, Few-shot Learning; Self-supervised Learning; Reinforcement Learning in Vision; Other Recent Topics and Applications

Books and References:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, 2016
2. Michael Nielsen, Neural Networks and Deep Learning, 2016
3. Yoshua Bengio, Learning Deep Architectures for AI, 2009
4. Richard Szeliski, Computer Vision: Algorithms and Applications, 2010.
5. Simon Prince, Computer Vision: Models, Learning, and Inference, 2012.
6. David Forsyth, Jean Ponce, Computer Vision: A Modern Approach, 2002.

Tools:

7. We will use PyTorch for our assignments.

DATA VISUALIZATION

B.Tech. IV Year I Sem.

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Course Objectives:

1. To Introduce the concept of Data Analytics Lifecycle.
2. To Develop Mathematical concepts required for advance regression.
3. To Understand data modeling in time series and its process.
4. To create awareness about Text analytics and its applications.
5. To provide overview of Data analytics and visualization with R.
6. To provide overview of Data analytics and visualization with Python.

Course Outcomes: After successful completion of the course students will be able to:

1 Comprehend basics of data analytics and visualization.
2 Apply various regression models on given data set and perform prediction.
3 Demonstrate advance understanding of Time series concepts and analysis of data using various time series models.
4 Analyze Text data and gain insights.
5 Experiment with different analytics techniques and visualization using R.
6 Experiment with different analytics techniques and visualization using Python.

UNIT-I

Introduction to Data analytics and life cycle: Data Analytics Lifecycle overview:, Key Roles for a Successful Analytics, Background and Overview of Data Analytics Lifecycle Project

Phase 1: Discovery: Learning the Business Domain, Resources Framing the Problem, Identifying Key Stakeholders. Interviewing the Analytics Sponsor, Developing Initial Hypotheses Identifying Potential Data Sources

Phase 2: Data Preparation: Preparing the Analytic Sandbox, Performing ETLT, Learning About the Data, Data Conditioning, Survey and visualize, Common Tools for the Data Preparation Phase

Phase 3: Model Planning: Data Exploration and Variable Selection, Model Selection, Common Tools for the Model Planning Phase

Phase 4: Model Building: Common Tools for the Model Building Phase

Phase 5: Communicate Results

Phase 6: Operationalize

UNIT-II

Regression Models: Introduction to simple Linear Regression: The Regression Equation, Fittedvalue and Residuals, Least Square

Introduction to Multiple Linear Regression: Assessing the Model, Cross-Validation, Model Selection and Stepwise Regression, Prediction Using Regression

Logistic Regression: Logistic Response function and logit, Logistic Regression and GLM, Generalized Linear model, Predicted values from Logistic Regression, Interpreting the coefficients and odds ratios, Linear and Logistic Regression: similarities and Differences, Assessing the models.

Time Series: Overview of Time Series Analysis Box-Jenkins Methodology, ARIMA Model Autocorrelation Function (ACF) ,Autoregressive Models ,Moving Average Models ,ARMA and ARIMA Models , Building and Evaluating an ARIMA Model, Reasons to Choose and Cautions

UNIT-III

Text Analytics: History of text mining, Roots of text mining overview of seven practices of text analytic, Application and use cases for Text mining: extracting meaning from unstructured text, Summarizing Text. Text Analysis Steps, A Text Analysis Example, Collecting Raw Text, Representing Text, Term

Frequency—Inverse Document Frequency (TFIDF), CategorizingDocuments by Topics, Determining Sentiments, Gaining Insights.

UNIT-IV

Data analytics and visualization with R: Introduction to R: Data Import and Export, Attribute and Data type, Descriptive statistics. Exploratory Data Analysis: Visualization before analysis, DirtyData, visualizing single variable, examining Multiple variable, Data Exploration versus presentation.

UNIT-V

Data analytics and Visualization with Python: Essential Data Libraries for data analytics: Pandas, NumPy, SciPy. Plotting and visualization with python: Introduction to Matplotlib, Basic Plotting with Matplotlib, Create Histogram, BarChart, Pie chart, Box Plot, violin plot using Matplotlib. Introduction to seaborn Library, MultiplePlots, Regression plot, regplot.

TEXT BOOKS:

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education services Wiley Publication
2. Data Analytics using Python: Bharati Motwani, Wiley Publications.
3. Practical Statistics for Data Scientists 50+ Essential Concepts Using R and Python, O‘Reilly Publications 2nd Edition
4. Practical Text Mining and statistical Analysis for non-structured text data applications,1st edition, Grey Miner,Thomas Hill.

References:

1. Data Mining, Concepts and Techniques: 3rd edition, Jiawei Han, Micheline Kamber and Jian Pei
2. Data Analytics using R, Bharati Motwani, Wiley Publications
3. Python for Data Analysis: 3rd Edition, Wes McKinney, Publisher(s): O'Reilly Media, Inc.

NATURAL LANGUAGE PROCESSING

B.Tech. IV Year I Sem.

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Prerequisites:
Data structures and compiler design

Course Objectives:

- Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Design, implement, and analyze NLP algorithms; and design different language modeling Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models forAmbiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and ImedZitouni, Pearson Publication

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

SOFT COMPUTING

B.Tech. IV Year I Sem.

L	T	P	C
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Course Objectives:

1. Familiarize with soft computing concepts.
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
4. Learn the concepts of Genetic algorithm and its applications
5. Acquire the knowledge of Rough Sets.

Course Outcomes:

1. Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
2. Understand fuzzy logic and reasoning to handle and solve engineering problems
3. Apply the Classification and clustering techniques on various applications.
4. Understand the advanced neural networks and its applications
5. Perform various operations of genetic algorithms, Rough Sets.
6. Comprehend various techniques to build model for various applications

UNIT - I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT - II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT - III

Fuzzy Decision Making, Particle Swarm Optimization.

UNIT - IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT – V

Rough Sets; Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

Text Books:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha, Cengage Learning Dept. of CSE/JNTUHCEH B.Tech. (Reg), w.e.f. 2018-19 Academic Year

References:

1. Principles of Soft Computing, S. N. Sivanandam & S.N.Deepa, 2nd Edition, Wiley India, 2008.
2. Genetic Algorithms-In Search, optimization and Machine learning, David E. Goldberg, Pearson Education.
3. Neuro-Fuzzy and Soft Computing, J.S.R.Jang, C.T.Sun and E.Mizutani, Pearson Education, 2004.
4. Fuzzy Sets & Fuzzy Logic, G.J. Klir & B. Yuan, PHI, 1995.
5. An Introduction to Genetic Algorithm, Melanie Mitchell, PHI, 1998.
6. Fuzzy Logic with Engineering Applications, Timothy J. Ross, McGraw- Hill International Editions, 1995