

SCSA1209	FOUNDATIONS OF DATA SCIENCE	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- Learn how to process raw data into formats necessary for analysis
- In-depth knowledge of fundamental data science concepts through motivating real-world case studies
- Understand the methods of data handling and big data

UNIT 1 DATA ACQUISITION**9 Hrs.**

Data Acquisition—Sources of acquiring the data - Internal systems and External systems- Web APIs, Data preprocessing- Exploratory Data Analysis (EDA)- Basic tools (plots, graphs and summary statistics) of EDA -Open Data Sources, Data APIs, Web Scrapping -Relational Database access (queries) to process/access data.

UNIT 2 DATA PREPROCESSING AND PREPARATION**9 Hrs.**

Data Munging, Wrangling - Data Visualization Basics -Plyr packages - Cast/Melt. Tableau: Creating Visualizations in Tableau- Data hierarchies, filters, groups, sets, calculated fields-Map based visualizations-Build interactive dashboards-Data Stories

UNIT 3 DATA QUALITY AND TRANSFORMATION**9 Hrs.**

Data imputation -Data Transformation (minmax, log transform, z-score transform etc.,). - Binning, Classing and Standardization. - Outlier/Noise& Anomalies

UNIT 4 HANDLING TEXT DATA**9 Hrs.**

Bag-of-words- Regular Expressions - Sentence Splitting and Tokenization - Punctuations and Stop words, Incorrect spellings - Properties of words and Word cloud - Lemmatization and Term-Document TxD computation -Sentiment Analysis (Case Study)

UNIT 5 PRINCIPLES OF BIG DATA**9 Hrs.**

Introduction to Big Data - Challenges of processing Big Data (Volume, Velocity and Variety perspective) - Use Cases.

Max.45Hrs.**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1 :** Explore the fundamental concepts of Data science.
CO2 : Identify and execute the basic data format.
CO3 : Understand basics of Data Preprocessing and Data Visualizatio
CO4 : Improve the Data quality through various transformations.
CO5 : Implement the methods of handling text data.
CO6 : Analyse and understand the basics of Big Data.

TEXT/REFERENCE BOOKS

1. Data Science at the Command Line, Jeroen Janssens, O'Reilly, 2015, ISBN 978-1-491-94785-2
2. Python for Data Analysis, Wes McKinney, O'Reilly, 2018, ISBN-13: 978-1-491-95766.
3. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from The Frontline. O'Reilly. 2014.
4. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max.Marks:100****Exam Duration: 3Hrs****PART A:** 10 questions of 2 marks each –No choice**20 Marks****PART B:** 2 questions from each unit of internal choice; each carrying 16 marks**80 Marks**

SCSA1206	ARTIFICIAL INTELLIGENCE SEARCH METHODS AND REASONING	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To understand the various characteristics of intelligent agents.
- To learn the different search strategies in AI.
- To understand the knowledge in solving AI problems.
- To learn the concepts of learning and communication in AI.
- To know about the various applications of AI.

UNIT 1 BASIC SCIENCE BEHIND AI**9 Hrs.**

Intelligence – Memory – Computation – Learning – AI's Foundation and History – Intelligent Agents: Features – Behaviour in the environment – Rationality – Nature and its Structure – Case Study: AI Programming Languages History: LISP – Prolog – Python.

UNIT 2 SEARCHING TOWARDS SOLUTION**9 Hrs.**

Searching Strategies: Informed Search: BFS – DFS – Depth Bounded DFS – Uninformed Search: Heuristic Functions – Hill Climbing Search – Best First Search – Local Maxima – Solution Space Search – Adversarial Search – Constraint Satisfaction Problem – Case Study: N-Queens Problem

UNIT 3 KNOWLEDGE: ROLE AND REPRESENTATION**9 Hrs.**

Knowledge – Definition and Management – Types: Declarative and Procedural Knowledge – Knowledge Engineering behind Logical Agents: Propositional Logic – First Order Logic – Inference: Forward and Backward Chaining – Ontological Engineering – Case Study: Ontology based knowledge representation

UNIT 4 APPROACHES BEHIND PLANNING AND REASONING**9 Hrs.**

Algorithm for Planning as State Space Search – Analysis of Planning Approach – Reasoning: Bayes Rule – Bayesian Network and its approximation – Hidden Markov Model – Kalman Filters – Decision Networks – Case Study: Wumpus World Problem

UNIT 5 DECODING AND LEARNING INTELLIGENCE**9 Hrs.**

Learning Algorithms: Classification and Regression with Linear Model – Non-Parametric Models – Ensemble Learning – Explanation Based Learning – Learning with Hidden Variables – AI Real Time Applications – Case Study: Nature Inspired Computation

Max.45Hrs.**COURSE OUTCOMES**

On completion of the course the student will be able to

- CO1 :** An ability to identify, analyze the search algorithm for the AI problems.
- CO2 :** Represent a problem using first order logic.
- CO3 :** Provide the knowledge-based agent to solve the problem.
- CO4 :** Understand the Informed search strategies.
- CO5 :** Apply the bayes rule to solve the problem for societal concern
- CO6 :** Design user centric applications that use AI concepts.

TEXT/REFERENCE BOOKS

1. Stuart J. Russel, Peter Norvig, "Artificial Intelligence a Modern Approach", 3rd Edition, Pearson Education, 2009.
2. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.
3. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc., 1st Edition, 2008.
4. David L. Poole and Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, 2nd Edition, 2010.
5. Ertel, Wolfgang, Introduction to Artificial Intelligence, 1st Edition, 2017

SCSA2204	APPLICATION BASED PYTHON PROGRAMMING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	50

COURSE OBJECTIVES

- To write application-based programs in python programming.
- To implement web application using Flask
- To implement web framework using Django.
- To implement web scraping and audio processing using python libraries.
- To develop basic and advanced games using python libraries.

SUGGESTED LIST OF EXPERIMENT

1. Rock, Paper & Scissors Game
2. Random Password Generator.
3. Guess The Number Game
4. Email Slicer with Python
5. Python program to check the validity of a Password
6. Python program to check is the website is live or not
7. Writing CSV files in Python
8. make simple calculator in python
9. Weather application using beautiful Soup and Request
10. Detection of face id using OpenCV
11. Game Programming:
 - a. Tic Tac Toe
 - b. Dots and Boxes
 - c. Snake and apple
12. Advanced Game Programming:
 - a. Adding image, scenery
 - b. Making moves
 - c. Turning and shooting
 - d. Badgers, Arrows, Collision
 - e. Adding Health meter, Clock
 - f. Adding music
13. Web Scraping using Beautiful Soup
14. Web Scraping using Mechanical Soup
15. Simple Audio Processing using Pyo

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1 :** Implement and develop application using python.
- CO2 :** Develop program for simple gaming applications
- CO3 :** Design basic and advanced games using python gaming libraries.
- CO4 :** Demonstrate web scraping using python beautiful soup.
- CO5 :** Demonstrate web scraping using python mechanical soup.
- CO6 :** Design and process audio files using pyo python framework.