RAGHU ENGINEERING COLLEGE

AUTONOMOUS

(Approved by AICTE, New Delhi, Accredited by NBA (CIV,ECE,MECH,CSE), NAAC with 'A⁺' grade & Permanently Affiliated to JNTU-GV, Vizianagaram)

Dakamarri, Bheemunipatnam Mandal, Visakhapatnam Dist. – 531 162 (A.P.)

Ph: +91-8922-248001, 248002 Fax: + 91-8922-248011

E-mail: principal@raghuenggcollege.com website: www.raghuenggcollege.com

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RAGHU ENGINEERING COLLEGE (AUTONOMOUS)
VISAKHAPATNAM

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INSTITUTE VISION

Envisioning to be a world class technical institution by synergizing quality education with ethical values.

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy; establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies, and strives for an efficient, responsive and transparent administration in all areas.

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Department of Computer Science and Engineering

VISION

To generate competent professionals to become part of the industry and research organizations at the national and international levels.

MISSION

To impart high quality professional training in undergraduate level with emphasis on basic principles of computer science and Engineering and to foster leading edge research in the fast-changing field.

To inculcate professional behavior, strong ethical values, innovative research capabilities and leadership abilities in the young minds so as to work with a commitment.

- M1:To impart high quality professional training at undergraduate level with emphasis on basic principles of computer science and Engineering and to foster leading edge research in the fast-changing field.
- M2:To inculcate innovative research capabilities and leadership abilities in the young minds so as to work with a commitment.
- M3:To inculcate professional behavior, strong ethical values in the young minds so as to work with a commitment.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

PEO 1: To produce graduates with a strong foundation in mathematics, science, engineering fundamentals, laboratory and work-based experiences to formulate and solve engineering problems in computer science engineering domains and shall have proficiency in implementation software tools and languages.

PEO 2: To progressively impart training to the students for success in various engineering positions within the core areas in computer science engineering, computational or adapting to the latest trends by learning themselves.

PEO 3: To produce graduates having the ability to pursue advanced higher studies and research. To have professional and communication skills to function as leaders and members of multidisciplinary teams in engineering and other industries with strong work ethics, organizational skills, teamwork, and understanding of the importance of being a thorough professional.

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MAPPING OF MISSION STATEMENTS WITH PEOs

MS/PEO	PEO 1	PEO 2	PEO 3
MS 1	3	2	2
MS 2	2	3	2
MS 3	2	2	3

1-Slight , **2**- Moderate, **3**- Substatial

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PROGRAM OUTCOMES	
Graduates of Computer Science and Engineering Will:	
PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to solve complex engineering problems.
PO 2	**Problem analysis:** Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and the cultural, societal, and environmental concerns.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods, including design of experiments, analysis, interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual and as a member or leader in diverse teams and multidisciplinary settings.
PO 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to

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	engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)
PSO 1: Apply the concepts and techniques of the Computer Science & Engineering branch and the Mathematical foundations in the significant domains to address the complex engineering problems.
PSO 2: Employ emerging computer languages, computer networks, database management systems and platforms in developing innovative career prospects as an entrepreneur.
PS0 3: Apply the knowledge of interdisciplinary skills, and domain-specific tools in working system processes to implement and deploy a quality-based software product to meet evolving needs.

Mapping of PEOs with POs and PSOs

PEO/PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
PEO 1	3	3	3	3	2	2	2	2		2		3	3	2	2
PEO 2	2	3	3	3	2	2	2	2	3	2	3	3	3	3	3
PEO 3	3	2	2	3	2	2	2	3	3	3	3	3	3	3	3

1-Slight , **2-** Moderate, **3-** Substatial

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(2344101) FUNDAMENTALS OF DATA SCIENCE

(CSD)

Programme& Branch	B.Tech& CSD	Sem	Category	L	T	P	Credit
Prerequisites:	Basic of Python, XML, HTML	4	Professional Core	3	0	0	3
Preamble :	The course offers a thorough introduction to data science, focusing on key concepts, data manipulation, diverse formats, and essential analytical and visualization skills.						

Course Objectives:
- To provide a comprehensive knowledge of data science using Python.
- To learn how to use pandas for data manipulation, including core concepts, data structures, and essential functionalities for handling and analyzing data.
- Acquire skills to efficiently read, write, and manage diverse data formats and storage systems
- Excel at combining, merging, reshaping, cleaning data, and managing duplicates for thorough analysis.
- To learn the essential concepts of data analytics and data visualization

Course Contents:

Unit-1	Data science: definition, Datafication, Exploratory Data Analysis, The Data science process, A data scientist role in this process. NumPy Basics: The NumPyndarray: A Multidimensional Array Object, Creating ndarrays ,Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Data Processing Using Arrays, Expressing Conditional Logic as Array Operations, Methods for Boolean Arrays , Sorting , Unique.	Contact Hours: 9
Unit-2	Getting Started with pandas: Introduction to pandas, Library Architecture, Features, Applications, Data Structures, Series, DataFrame, Index Objects, Essential Functionality Reindexing, Dropping entries from an axis, Indexing, selection, and filtering),Sorting and ranking, Summarizing and Computing Descriptive Statistics, Unique Values, Value Counts, Handling Missing Data, filtering out missing data.	Contact Hours:9
Unit-3	**Data Loading, Storage, and File Formats** : Reading and Writing Data in Text Format, Reading Text Files in Pieces, Writing Data Out to Text Format, Manually Working with Delimited Formats, JSON Data, XML and HTML: Web Scraping, Binary Data	Contact Hours:9

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	Formats,Using HDF5 Format, Reading Microsoft Excel Files, Interacting with Databases, Storing and Loading Data in MongoDB	
Unit-4	Data Wrangling: Combining and Merging Data Sets, Database style DataFrame Merges, Merging on Index, Concatenating Along an Axis, Combining Data with Overlap , Reshaping and Pivoting, Reshaping with Hierarchical Indexing, Data Transformation, Removing Duplicates, Replacing Values.	Contact Hours:9
Unit-5	Plotting and Visualization: A Brief matplotlib API Primer, Figures and Subplots, Colors, Markers, and Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File, Plotting Functions in pandas, Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots.	Contact Hours:9
		Total Hours: 45

Text Books:	
1	WesMcKinney,"PythonforDataAnalysis",O"REILLY,ISBN:978-1-449-31979-3,1ˢᵗedition,October2012.
2	RachelSchutt&O"neil,"DoingDataScience",O"REILLY,ISBN:978-1-449-35865-5,1ˢᵗedition, October2013
Reference Books:	
1	Joel Grus, "Data Science from Scratch: First Principles with Python", O"Reilly Media, 2015
2	Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.
3	"Pandas for Everyone: Python Data Analysis" by Daniel Y. Chen
4	"Python Data Science Handbook" by Jake VanderPlas
Web References :	
1	https://www.youtube.com/watch?v=aYmcRnmZVGQ&list=PL9n0l8rSshSnragNblKDBsT8Xu3otp3jA
2	https://www.youtube.com/watch?v=ZyhVh-qRZPA&list=PL-osiE80TeTsWmV9i9c58mdDCSskIFdDS
3	https://www.youtube.com/watch?v=vrwt3R8PIeA
4	https://www.youtube.com/watch?v=anRWVo6ti1k&list=PLba2xJ7yxHB6ybgtaIsTKmmF2Nl2wAe2S
5	https://www.youtube.com/watch?v=9GvnrQv138s&list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR
Preamble :	Upon completion of the course, students shall have ability to understand and use NumPy and pandas for data analysis, manipulate data with pandas, handle various formats, apply data wrangling techniques, and master Matplotlib and pandas for visualization.
COURSE OUTCOMES:	**BT Mapped**

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Upon completion of the course, students shall have ability to	(Highest Level)
CO 1 Apply principles of NumPy and Pandas to the analysis of data.	Applying
CO 2 Develop skills in pandas for data manipulation, with a focus on its architecture, features, data structures, and key functionalities.	Applying
CO 3 Apply and analyze data handling techniques for text, JSON, XML, binary formats, Excel, databases, and MongoDB	Applying& Analysis
CO 4 Effectively employ techniques for data wrangling.	Applying
CO 5 Comprehensive Foundation in Using Matplotlib and Pandas for Effective Data Visualization	Understanding

Mapping of Cos with POs and PSOs

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	3	-	-	-	1	-	-	1	3	3	3
CO2	2	2	-	1	3	-	-	-	-	-	-	1	3	2	3
CO3	3	3	-	2	3	-	-	-	-	-	-	1	3	2	3
CO4	2	3	-	2	3	-	-	-	-	-	-	1	2	2	3
CO5	2	3	-	2	3	-	1	-	-	-	-	1	2	2	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy															

ASSESSMENT PATERN – THEORY							
TEST	**Remembering (K1)%**	**Understanding (K2)%**	**Applying (K3)%**	**Analyzing (K4)%**	**Evaluating (K5)%**	**Creating (K6)%**	**Total %**
MID-1	25	30	30	15			100
MID-2	25	30	30	15			100
SEE	30	35	25	5			100
*± 3% may be varied							

(Signature)   (Signature)
Head of the Department   Principal
(Seal/Stamp)   (Seal/Stamp)