M.S. Ramaiah University of Applied Sciences

New BEL Road, MSR Nagar, Bangalore – 560054

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

PO, PSO, PEO & CO

Programme: M.Tech. in Data Science & Engineering

Programme Code: 115

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Program Educational Objectives (PEO)

Course Outcomes (CO)

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Bangalore-560058

Registrar
M.S. Ramaiah University of Applied Sciences
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Faculty of Engineering and Technology (FET)

Programme Name: M.Tech. (Data Science & Engineering)

Programme Outcomes (POs)

M.Tech. graduates will be able to:

PO-1. Acquire, comprehensive knowledge and understanding of the methodologies, principles, practices and technologies of the engineering domain to solve complex problems with technical competence

PO-2. Conceptualize, apply, analyze, synthesize and evaluate information related to complex engineering problems using principles of mathematics, science and engineering to create new and innovative solutions

PO-3. Provide solutions to engineering problems by designing systems, components or processes to meet the specified needs considering public health, safety, societal and the environmental considerations

PO-4. Review research literature, standards, guidelines, best practices, research methods and laboratory techniques to solve engineering problems through experimental investigations, analysis and interpretation of results

PO-5. Create, select and apply appropriate techniques and IT tools to model and solve complex engineering activities and utilize available resources effectively

PO-6. Understand the effect of engineering solutions on legal, cultural, social, public health and safety aspects and the consequent responsibilities

PO-7. Develop sustainable engineering solutions and assess their effect on society and environment

PO-8. Understand and apply ethical principles to engineering practices and professional responsibilities

PO-9. Function effectively as an individual or a team player to handle diverse problems in multi-disciplinary settings

PO-10. Make oral and written presentations to communicate technical ideas effectively to engineering community and society at large

PO-11. Apply the knowledge of engineering and management principles to manage projects in multi-disciplinary environments with consideration to cost and time

PO-12. Engage in lifelong learning and adapt to changing engineering/technology and societal requirements

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Program Educational Objectives (PEOs)

The Programme educational objectives of the M.Tech. (Data Science & Engineering) Programme are:

PEO-1. To provide in-depth knowledge in the specialized engineering domain to enable them to deliver efficient solutions for complex engineering problems by critical thinking

PEO-2. To enable students to design and develop sustainable innovative solutions for industry and societal requirements through applied research by conducting engineering investigations through experimentation and usage of modern tools

PEO-3. To inculcate ethics, communication, leadership, soft, managerial and entrepreneurial skills for successful career in industries and to engage in lifelong learning

Programme Specific Outcomes (PSOs)

At the end of the M.Tech. (Data Science & Engineering) program, the graduate will be able to:

PSO-1. Apply principles of Data Science at large and in particular that of Big Data to real-lifeproblems employing critical analysis

PSO-2. Design and develop sustainable and Big Data solutions to address industrial and societal requirements of insightful knowledge extraction by applying concepts and techniques of Data Mining, Data Processing, Distributed and Cloud Computing

PSO-3. Demonstrate leadership qualities, communication, entrepreneurial skills, decision making based on ethics and passion for lifelong learning for improvement of organization, environment and society

Course Outcomes (COs)

Course Title & Code: Mathematics for Machine Learning **(19MIC501A)**

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

CO-1. To discuss geometric terms such as planes in higher dimensions and perform mathematical operations on them.

CO-2. To apply different methods to analyse patterns in data and use them to predict, understand, and improve results.

CO-3. To design techniques for reducing the number of variables in training data when dealing with high dimensional data.

CO-4. To discuss the methods for accurate data representation in a lower-dimensional space.

CO-5. To apply the techniques for predicting continuous and discrete values.

CO-6. To develop methods for finding optimal parameter configuration for high dimensional functions.

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Course Outcomes (COs)

Course Title & Code: Programming for Data Science **(**19DSC501A**)**

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

- **CO-1.** To discuss basic Python programming concepts and execution.
- **CO-2.** To develop different ways of organizing data and working with functions.
- **CO-3.** To apply different libraries for multidimensional array objects, data visualization, data manipulation, and data analysis.
- **CO-4.** To apply relational database concepts and foundational knowledge for communicating with and extracting data from databases.
- **CO-5.** To identify obvious errors and understanding patterns within the data, detect outliers, and find interesting relations among the variables

Course Outcomes (COs)

Course Title & Code: Data Mining **(**19DSC502A**)**

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

- **CO-1.** To be able to understand the fundamental concepts essential in data science, from data acquisition to insight and social impacts of big data.
- **CO-2.** To design data analytics applications using machine learning and data mining techniques for knowledge discovery
- **CO-3.** To develop algorithms, statistical approaches and visualization techniques for explorations of large scale data.
- **CO-4.** To develop prototypes for new data analytics applications.
- **CO-5.** To analyse the data as well as the performance of the data analytics applications
- **CO-6.** To apply appropriate methodologies to selected applications in data science.

Course Outcomes (COs)

Course Title & Code: Artificial Intelligence **(**19MIC502A**)**

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

- **CO-1.** Describe the concepts of artificial intelligence and intelligent agents
- **CO-2.** Explain the principles of knowledge representation, search strategies, learning, reasoning and planning
- **CO-3.** Apply the principles of knowledge representation, search strategies, learning, reasoning and planning to design intelligent agents
- **CO-4.** Analyze a scenario and identify strategies for knowledge representation, search, learning, reasoning and planning
- **CO-5.** Synthesize an intelligent agent for a given scenario
- **CO-6.** Evaluate the performance of an intelligent agent based on appropriate measures of performance

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Course Outcomes (COs)

Course Title & Code: Data Processing **(19DSC503A)**

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

- **CO-1.** To choose appropriate data processing techniques, frameworks and tools for a structured data
- **CO-2.** To develop models for structured data using relational and data cube schemas
- **CO-3.** To design a data processing application for structured data using structured data processing techniques, frameworks and tools
- **CO-4.** To synthesize a data processing application for structured data
- **CO-5.** To analyze structured data using a data processing workflow
- **CO-6.** To evaluate alternative solutions to a data processing problem

Course Outcomes (COs)

Course Title & Code: Research Methodology and IPR **(20FET508A)**

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

- **CO-1.** Describe the value, scope, relevance and mandatory steps of research as well as principles of effective research, Nature of Intellectual Property.
- **CO-2.** Discuss the guidelines to progress from the choice of broad field of research to specific topic of research, patent rights, process of patenting at National and International level, New Developments in IPR.
- **CO-3.** Demonstrate the application and utility of the Systematic approach and out of box thinking concepts for research to be effective.
- **CO-4.** Adapt, analyze and prepare well-structured research proposal and research paper invoking clearly outlined principles.

Course Outcomes (COs)

Course Title & Code: Professional Communication **(19FET509A)**

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

- **CO-1.** Compose effective written business communication
- **CO-2.** Practice the techniques of presentation

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Course Outcomes (COs)

Course Title & Code: Artificial Neural Networks **(19MIC504A)**

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

- **CO-1.** Demonstrate an understanding of the various concepts and techniques of ANNs.
- **CO-2.** Determine under which circumstances ANNs are useful in solving real-world problems.
- **CO-3.** Discuss the main factors involved in achieving good learning and generalization performance in neural network systems.
- **CO-4.** Build different kinds of ANNs, train them, evaluate their performance, and use them to solve complex problems.
- **CO-5.** Evaluate whether neural networks are appropriate to a particular application.
- **CO-6.** Analyze the steps needed to improve performance of the selected neural network

Course Outcomes (COs)

Course Title & Code: Advanced Data Processing **(19DSC505A)**

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

- **CO-1.** To choose appropriate data processing techniques, frameworks and tools for a Big Data
- **CO-2.** To develop models for structured data using Big Data models
- **CO-3.** To design a Big Data processing application using modern data processing techniques, frameworks and tools
- **CO-4.** To synthesize a data processing application for big data
- **CO-5.** To analyze big data using a data processing workflow
- **CO-6.** To evaluate alternative solutions to a big data processing problem

Course Outcomes (COs)

Course Title & Code: Distributed Computing **(19DSE501A)**

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

- **CO-1.** Discuss the distributed and cloud computing models for big data and their role in data science and engineering
- **CO-2.** Recommend appropriate protocols, techniques and infrastructure for designing distributed and cloud computing systems for big data
- **CO-3.** Discuss security challenges for big data computing in distributed environments and recommend appropriate solutions
- **CO-4.** Design distributed algorithms using appropriate protocols, techniques and infrastructure
- **CO-5.** Design and develop distributed and cloud computing application for big data using appropriate architectural models and techniques
- **CO-6.** Analyze timing, fault tolerance, safety and reliability of distributed and cloud computing systems

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Course Outcomes (COs)

Course Title & Code: Natural Language Processing **(19DSE502A)**

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

- **CO-1.** Describe the fundamental mathematical models and algorithms for NLP.
- **CO-2.** Explain major natural language processing challenges in various domains.
- **CO-3.** Discuss statistical language models and machine learning algorithms to extract information from various text data.
- **CO-4.** Apply mathematical models and algorithms in the design and implementation for NLP.
- **CO-5.** Recommend natural language processing tools currently available for unstructured text processing.
- **CO-6.** Implement methods for syntax and semantic analysis in NLP.

Course Outcomes (COs)

Course Title & Code: Text Mining and Visualization **(19DSE503A)**

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

- **CO-1.** To apply basic methods for information extraction for retrieval of textual data
- **CO-2.** To apply text processing techniques to prepare documents for statistical modelling
- **CO-3.** To develop proper machine learning models for analyzing textual data and correctly interpreting the results
- **CO-4.** To use relevant machine learning models for text prediction
- **CO-5.** To evaluate the performance of machine learning models for textual data
- **CO-6.** To visualize text mining and machine learning results for various application

Course Outcomes (COs)

Course Title & Code: Big Data for Software Defined Networking **(19DSE504A)**

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

- **CO-1.** Describe the limitations of traditional networking architectures engineering
- **CO-2.** Explain the significance and role of SDN architecture in present day networks
- **CO-3.** Discuss and recommend SDN based protocols, controllers and implementations for networking
- **CO-4.** Develop and conceptualize SDN based solutions for sample use cases used in the industry
- **CO-5.** Evaluate the performance of machine learning models for textual data
- **CO-6.** Analyze the functionality and performance of the developed SDN based solutions for networking use cases

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Course Outcomes (COs)

Course Title & Code: Time Series Analysis **(20DSE507A)**

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

- **CO-1.** Explain time series data with an appropriate statistical framework and examples
- **CO-2.** Perform appropriate preprocessing and carryout exploratory data analysis on time series data
- **CO-3.** Apply appropriate filters, smoothing techniques on time series data and interpret the results
- **CO-4.** Discuss appropriate statistical modelling techniques for forecasting time series data
- **CO-5.** Apply and forecast time series data using stationary, non-stationary, multivariate time series models
- **CO-6.** Use R to model, forecasts and interpret the results for time series data

Course Outcomes (COs)

Course Title & Code: Big Data and Healthcare **(19DSE505A)**

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

- **CO-1.** To discuss patient data for various diseases such as Diabetes and the medical background that is required for applying data science and AI; to discuss data capturing methods for healthcare.
- **CO-2.** To discuss big data challenges, feature extraction and selection, key machine learning algorithms and their use and implementation in healthcare systems.
- **CO-3.** To select learning methods, algorithms and tune them for use in healthcare.
- **CO-4.** To design and implement machine learning systems for healthcare; to identify and apply deep learning algorithms for healthcare.
- **CO-5.** To integrate data science and AI in healthcare through best practices, feedback loops and intelligent agents; to design for scalability, privacy and appropriate visualization; to discuss ethical aspects of intelligent systems.
- **CO-6.** To summarize current trends and future work in Big Data for healthcare through a literature survey on chosen topics of Data Science, AI and healthcare, from standard journals and from discussions in seminars

Course Outcomes (COs)

Course Title & Code: Value Education **(19FET520A)**

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

- **CO-1.** Discuss the role of Values and Ethics in Self-Development
- **CO-2.** Appreciate the importance of Universal Brotherhood

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Course Outcomes (COs)

Course Title & Code: Internship (19MIC521A)

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

- **CO-1.** Recognise the need for developing a new or improving an existing engineering product/system through an organised survey of literature
- **CO-2.** Define engineering design specifications
- **CO-3.** Design, model, solve, analyse the product/system to meet the design specifications
- **CO-4.** Evaluate the performance of the modelled system and justify its performance
- **CO-5.** Demonstrate the system working in a virtual environment and make a presentation
- **CO-6.** Write a technical report Alternatively,

Course Outcomes (COs)

Course Title & Code: Group Project (19MIC522A)

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

- **CO-1.** To Work in a team and undertake a project in their area of specialization
- **CO-2.** To Apply their knowledge of general and automotive engineering and application, develop a system for automotive application.
- **CO-3.** To apply appropriate research methodology while formulating a project
- **CO-4.** To Prepare specifications, design, analyse, synthesize, prototype and assess the system
- **CO-5.** To Prepare and present appropriate forms of audio-visual and verbal presentations, and written document, to describe the project, its execution and outcome

Course Outcomes (COs)

Course Title & Code: Dissertation and Publication (19MIC523A)

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

- **CO-1.** Critically review scholarly literature collected from various sources for the project purpose and formulate a research problem
- **CO-2.** Prepare and present a research proposal
- **CO-3.** Conduct research to achieve research objectives
- **CO-4.** Propose new ideas/methodologies or procedures for further improvement of the research undertaken
- **CO-5.** Create research document and write research papers for publications
- **CO-6.** Defend the research findings in front of scholarly audience

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