

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 Artificial Intelligence & Machine Learning

Programme Code: 126

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Program Educational Objectives (PEO)

Course Outcomes (CO)

Dean

Faculty of Engineering and Technology
M.S. Ramaiah University of Applied Sciences
Bangalore-560058

Registrar

M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Faculty of Engineering and Technology (FET)

Programme Name: M.Tech. (Artificial Intelligence & Machine Learning)

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. (Artificial Intelligence & Machine Learning) 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. (Artificial Intelligence & Machine Learning) program, the graduate will be able to:

- PSO-1. Apply the knowledge and principles of aerospace design to conceptualize and develop efficient solutions to complex engineering problems through critical analysis
- PSO-2. Design and develop sustainable aerospace design solutions to industry and societal requirements through applied research, concepts and techniques involving experimentation and usage of modern design and modelling tools
- PSO-3. Demonstrate ethics, leadership qualities, communication, entrepreneurial skills and involvement in lifelong learning for betterment of organisation, 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: Mathematics for Machine Learning (19MIC501A)

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, datamanipulation, and data analysis.
- CO-4. To apply relational database concepts and foundational knowledge for communicating withand extracting data from databases.
- CO-5. To identify obvious errors and understanding patterns within the data, detect outliers, andfind 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 explorationsof 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)

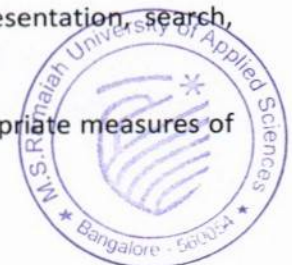
Course Title & Code: Artificial Intelligence (19MIC502A)

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, reasoningand planning
- CO-3. Apply the principles of knowledge representation, search strategies, learning, reasoning andplanning 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: 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

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 Machine Learning (20MIE507A)

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

- CO-1. Discuss the concepts of Neural networks.
- CO-2. Discuss the principles of Back propagation Algorithm.
- CO-3. Discuss the concepts of Radial Basis Neural networks


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- CO-4. Discuss the principles of Support Vector Machines.
- CO-5. Discuss the Unsupervised Learning Techniques

Course Outcomes (COs)

Course Title & Code: Pattern Recognition (19MIC505A)

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: Value Education (19FET510A)

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

Course Outcomes (COs)

Course Title & Code: Computational Intelligence (19MIE501A)

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

- CO-1. Discuss the underlying concepts of fuzzy systems, evolutionary computation, swarm intelligence and artificial immune systems.
- CO-2. Analyse whether a specific engineering problem can be dealt with Computational Intelligence
- CO-3. Compare and contrast the use of different Computational Intelligence techniques to achieve particular functionalities
- CO-4. Recommend the most suitable Computational Intelligence technique to address a specific engineering problem.
- CO-5. Specify, implement, customize, and evaluate typical Computational Intelligence algorithms in response to a practical problem
- CO-6. Develop variants and hybrids of typical Computational Intelligence algorithms.


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Course Outcomes (COs)

Course Title & Code: Deep Learning (19MIE502A)

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

- CO-1. To discuss traditional machine learning techniques that have had an influence on deep learning algorithms
- CO-2. To use Tensor Flow to implement neural networks; to manage problems that arise as networks are made deeper.
- CO-3. To perform effective dimensionality reduction using auto encoders
- CO-4. To discuss convolution operator and the building blocks for convolutional network architectures; to build neural networks that analyze complex images.
- CO-5. To discuss and apply practical design process for deep learning applications; to perform sequence analysis to examine language.
- CO-6. To apply deep reinforcement learning techniques.
- CO-7. To discuss and apply Generative Networks

Course Outcomes (COs)

Course Title & Code: Probabilistic Graphical Models (19MIE503A)

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

- CO-1. Discuss the principles of representation, inference, and learning in the context of Probabilistic Graphical Models (PGMs)
- CO-2. Discuss the application of Bayesian and Gaussian network models
- CO-3. Apply graphical inference methods and learning algorithms for a given representation
- CO-4. Develop a representation scheme and an inference framework for a given application
- CO-5. Develop algorithms for construction/learning network models from data
- CO-6. Evaluate different representations, inference and learning algorithms for a given application

Course Outcomes (COs)

Course Title & Code: AI for Healthcare (19MIE504A)

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

- CO-1. To discuss the role and assess the benefits and risks of Artificial Intelligence in Healthcare; to discuss the present state and future of AI in major Healthcare specialties
- CO-2. To apply text mining and Natural Language Processing methods to extract information from Electronic Health Records
- CO-3. To predict the outcome of interventions: causal inference from observational data.
- CO-4. To discuss the role of deep learning in diagnosis and drug discovery and apply deep learning to problems in healthcare.
- CO-5. To discuss ethics of machine learning and apply bias and fairness criteria


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Course Outcomes (COs)

Course Title & Code: Computer Vision (19MIE505A)

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

- CO-1. Discuss fundamentals of Digital Images with Image Formation and processing.
- CO-2. Discuss Image processing Techniques.
- CO-3. Analyse and apply Image processing algorithms to solve recent computer vision problems
- CO-4. Gather a basic understanding about the geo-metric relationships between 2D images and the 3D world. Apply classification, clustering, and tracking algorithms for a given computer vision application.
- CO-5. Apply classification, clustering, and tracking algorithms for a given computer vision application.

Course Outcomes (COs)

Course Title & Code: AI for Healthcare (19MIE504A)

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

- CO-1. To discuss and apply concepts of discrete planning, decision-theoretic planning.
- CO-2. To discuss and apply concepts of sequential decision theory; to apply reinforcement learning to robots.
- CO-3. To discuss and apply the concepts of sensors and information spaces.
- CO-4. To perform planning under sensing uncertainty
- CO-5. To discuss planning in a continuous space

Course Outcomes (COs)

Course Title & Code: Information Theory and Coding (19MIE507A)

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

- CO-1. Discuss types of information sources, Shannon entropy, encoding techniques, mutual information, channels, and channels capacity.
- CO-2. Discuss the basic concepts of Information Theory and fundamental limits to information transmission via Shannon's theorems.
- CO-3. Apply information theory to compute the entropy of sources and channel capacities.
- CO-4. Design encoders and decoders for error control coding techniques
- CO-5. Evaluate information measures and various codes for a given application


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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,
- CO-7. Write a report on experiences during internship
- CO-8. Make a presentation to a panel of examiners

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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