



BVV Sangha, Bagalkot
AMRUTA INSTITUTE OF ENGINEERING & MANAGEMENT SCIENCES

Approved by AICTE, New Delhi
Recognized by Government of Karnataka & Affiliated to VTU, Belagavi

AIEMS
BENGALURU

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Program Outcomes (POs)

PO 1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO 2	Problem analysis: Identify, 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 the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and 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 modelling 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 and 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 in 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 own 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 engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO 1	Understand fundamentals of Artificial Intelligence and Machine language concepts with proficiency in programming Skills to develop efficient AI based software system.
PSO 2	Apply Artificial Intelligence and machine language concepts to design, develop and solve real world problems as per user requirements.
PSO 3	Integrate the Engineering skills and serve the industry and society equally well at the global standards

Course Outcomes (Cos)

Course Code	Course	CO's	Course Outcome
BMATS101	Mathematics-I	CO1	Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
		CO2	Analyze the solution of linear and nonlinear ordinary differential equations
		CO3	Get acquainted and to apply modular arithmetic to computer algorithms
		CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
		CO5	familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB
BMATS201	Mathematics-II	CO1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume..
		CO2	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors.Orthogonal curvilinear coordinates
		CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
		CO4	Apply the knowledge of numerical methods in analysing the discrete data and solving the physical and engineering problems.
		CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB
BPHYS102/202	Applied Physics for CSE Stream	CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.
		CO2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
		CO3	Summarize the essential properties of superconductors and its applications in qubits.
		CO4	Illustrate the application of physics in design and data analysis.
		CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

BCHE102/202	Applied Chemistry	CO1	CO1. Identify the terms and applications processes involved in scientific and engineering
		CO2	CO2. Explain the phenomena of chemistry to describe the methods of engineering processes
		CO3	CO3. Solve the problems in chemistry that are pertinent in engineering applications
		CO4	CO4. Apply the basic concepts of chemistry to explain the chemical properties and processes Analyze properties and multi disciplinary situations processes associated with chemical substances disciplinary situations
BPOPS103/203	Principles of Programming using C	CO1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
		CO2	Apply programming constructs of C language to solve the real world problem
		CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
		CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
		CO5	Design and Develop Solutions to problems using modular programming constructs using functions
BESCK104E/204E	Introduction to C Programming	CO1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
		CO2	Apply programming constructs of C language to solve the real world problem
		CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
		CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
		CO5	Design and Develop Solutions to problems using modular programming constructs using functions
BPLCK105A/BPLCK205A	Introduction to Web Programming	CO1	Explain the historical context and justification for HTML over XHTML
		CO2	Develop HTML5 documents and adding various semantic markup tags
		CO3	Analyse various attributes, values and types of CSS
		CO4	Implement core constructs and event handling mechanisms of JavaScript.
BPLCK105B/205B	Introduction to Python Programming	CO1	Demonstrate proficiency in handling loops and creation of functions.
		CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
		CO3	Develop programs for string processing and file organization
		CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
BPLCK105C/BPLCK205C	Basics of Java Programming	CO1	To explain the features and object oriented concepts in JAVA programming
		CO2	To analyse working of bitwise operators in JAVA

		CO3	To develop simple programs based on polymorphism and inheritance
		CO4	To describe the concepts of importing packages and exception handling mechanism
Introduction to C++ Programming	BPLCK105D/BPLCK205D	CO1	Able to understand and design the solution to a problem using object-oriented programming concepts.
		CO2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.
		CO3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism
		CO4	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems.
BCEDK203/203	Computer Aided Engineering Drawing (Common to All)	CO1	Draw and communicate the objects with definite shape and dimensions
		CO2	Recognize and Draw the shape and size of objects through different views
		CO3	Develop the lateral surfaces of the object
		CO4	Create a Drawing views using CAD software.
		CO5	Identify the interdisciplinary engineering components or systems through its graphical representation.
BPWSK206-106	Professional Writing Skills in English	CO1	To understand and identify the Common Errors in Writing and Speaking.
		CO2	To Achieve better Technical writing and Presentation skills.
		CO3	To read Technical proposals properly and make them to Write good technical reports.
		CO4	Acquire Employment and Workplace communication skills.
		CO5	To learn about Techniques of Information Transfer through presentation in different level.
BCS301	Mathematics for Computer Science	CO1	Explain the basic concepts of probability, random variables, probability distribution
		CO2	Apply suitable probability distribution models for the given scenario.
		CO3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
		CO4	Use statistical methodology and tools in the engineering problem-solving process.
		CO5	Compute the confidence intervals for the mean of the population.
		CO6	Apply the ANOVA test related to engineering problems.
BCS302	Digital Design and Computer Organization	CO1	Apply the K-Map techniques to simplify various Boolean expressions.
		CO2	Design different types of combinational and sequential circuits along with Verilog programs.
		CO3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.
		CO4	Explain the approaches involved in achieving communication between processor and I/O devices.
		CO5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance
BCS303	OPERATING SYSTEMS	CO1	Explain the structure and functionality of operating system

		CO2	Apply appropriate CPU scheduling algorithms for the given problem.
		CO3	Analyse the various techniques for process synchronization and deadlock handling.
		CO4	Apply the various techniques for memory management
		CO5	Explain file and secondary storage management strategies.
		CO6	Describe the need for information protection mechanisms
BCS304	DATA STRUCTURES AND APPLICATIONS	CO1	Explain different data structures and their applications.
		CO2	Apply Arrays, Stacks and Queue data structures to solve the given problems.
		CO3	Use the concept of linked list in problem solving.
		CO4	Develop solutions using trees and graphs to model the real-world problem.
		CO5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.
BCS306A	Object Oriented Programming with JAVA	CO1	Demonstrate proficiency in writing simple programs involving branching and looping structures.
		CO2	Design a class involving data members and methods for the given scenario.
		CO3	Apply the concepts of inheritance and interfaces in solving real world problems.
		CO4	Use the concept of packages and exception handling in solving complex problem
		CO5	Apply concepts of multithreading, autoboxing and enumerations in program development
BDS306B	Python Programming for Data Science	CO1	Describe the constructs of python programming
		CO2	Use looping and conditional constructs to build programs.
		CO3	Apply the concept of data structure to solve the real world problem.
		CO4	Use the NumPy constructs for matrix manipulations
		CO5	Apply the Panda constructs for data analytics.
BDS306C	Data Analytics with R	CO1	Describe the structures of R Programming.
		CO2	Illustrate the basics of Data Preparation with real world examples.
		CO3	Apply the Graphical Packages of R for visualization.
		CO4	Apply various Statistical Analysis methods for data analytics.
BSCK307	Social Connect & Responsibility	CO1	Provide a formal platform for students to communicate and connect to the surrounding.
		CO2	create a responsible connection with the society.
		CO3	Understand the community in general in which they work.
		CO4	Identify the needs and problems of the community and involve them in problem –solving.
		CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
BCS358A	Data Analytics with Excel	CO1	To Apply analysis techniques to datasets in Excel
		CO2	Learn how to use Pivot Tables and Pivot Charts to streamline your workflow in Excel

		CO3	Understand and Identify the principles of data analysis
		CO4	Become adept at using Excel functions and techniques for analysis
		CO5	Build presentation ready dashboards in Excel
BAI358B	Ethics and Public Policy for AI	CO1	Describe Ethical Framework for a Good AI Society, establishing Rules for trustworthy AI
		CO2	Explain ethics for good society
		CO3	Illustrate various Tools, methods and practices for designing AI for social good
		CO4	Describe the Innovation and future AI
		CO5	Illustrate Regulation and Governance of AI ethics in Healthcare domain.
BCS358C	Project Management with Git	CO1	To familiar with basic command of Git
		CO2	To create and manage branches
		CO3	To understand how to collaborate and work with Remote Repositories
		CO4	To familiar with virion controlling commands
BAI358D	PHP Programming	CO1	To introduce the PHP syntax, elements, and control structures
		CO2	To make use of PHP Functions and File handling
		CO3	To illustrate the concept of PHP arrays and OOPs
BCS401	Analysis & Design of Algorithms	CO1	Apply asymptotic notational method to analyze the performance of the algorithms in terms of time complexity.
		CO2	Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational problems.
		CO3	Make use of transform & conquer and dynamic programming design approaches to solve the given real world or complex computational problems.
		CO4	Apply greedy and input enhancement methods to solve graph & string based computational problems.
		CO5	Analyse various classes (P, NP and NP Complete) of problems
		CO6	Illustrate backtracking, branch & bound and approximation methods.
BAD402	ARTIFICIAL INTELLIGENCE	CO1	Apply knowledge of agent architecture, searching and reasoning techniques for different applications.
		CO2	Compare various Searching and Inferencing Techniques.
		CO3	Develop knowledge base sentences using propositional logic and first order logic
		CO4	Describe the concepts of quantifying uncertainty. CO
		CO5	Use the concepts of Expert Systems to build applications.
BCS403	DATABASE MANAGEMENT SYSTEM	CO1	Describe the basic elements of a relational database management system
		CO2	Design entity relationship for the given scenario.
		CO3	Apply various Structured Query Language (SQL) statements for database manipulation. Analyse various normalization forms for the given application. Develop database applications for the given real world problem. Understand the concepts related to NoSQL databases.

BCS405A	DISCRETE MATHEMATICAL STRUCTURES	CO1	Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements.
		CO2	Demonstrate the application of discrete structures in different fields of computer science.
		CO3	Apply the basic concepts of relations, functions and partially ordered sets for computer representations.
		CO4	Solve problems involving recurrence relations and generating functions.
		CO5	Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering.
BAI405B	METRIC SPACES	CO1	Explain basic facts about the cardinality of a set and various set-theoretic paradoxes.
		CO2	Apply the concepts of open and closed spheres and bounded sets to solve problems.
		CO3	Demonstrate standard concepts of metric spaces and their properties.
		CO4	Identify the continuity of a function defined on metric spaces and homomorphism.
BCS405C	OPTIMIZATION TECHNIQUE	CO1	Apply the concepts of vector calculus to solve the given problem.
		CO2	Apply the concepts of partial differentiation in machine learning and deep neural networks.
		CO3	Analyze the convex optimization algorithms and their importance in computer science & engineering.
		CO4	Apply the optimization algorithms to solve the problem.
		CO5	Analyze the advanced optimization algorithms for machine learning
BAI405D	ALGORITHMIC GAME THEORY	CO1	Interpret the basics of strategic gaming and extensive games.
		CO2	Analyze gaming strategies on real-time incidence. Develop the models of gaming on real-time incidence.
		CO3	Apply game theory in the real world problems.
BDSL456A	Scala	CO1	Get familiar with the Scala syntax and object-oriented principles
		CO2	Learn advanced concepts - loops, expressions, inheritance, pattern matching
		CO3	Learn to write clean and functional Scala codes and test it
		CO4	Learn functional programming using Scala
BDSL456B	MongoDB	CO1	Make use of MangoDB commands and queries.
		CO2	Illustrate the role of aggregate pipelines to extract data.
		CO3	Demonstrate optimization of queries by creating indexes.
		CO4	Develop aggregate pipelines for text search in collections.
BDSL456C	MERN	CO1	Apply the fundamentals of MongoDB, such as data modelling, CRUD operations, and basic

			queries to solve given problem.
		CO2	Use constructs of Express.js, including routing, software and constructing RESTful APIs to solve real world problems.
		CO3	Develop scalable and efficient RESTful APIs using NodeJS.
		CO4	Develop applications using React, including components, state, props, and JSX syntax.
BDSL456D	Julia	CO1	Apply concepts of data-types, selection and looping constructs of Julia programming language.
		CO2	Demonstrate the use of strings, functions, arrays and matrix operations in solving problems.
		CO3	Develop programs involving data structures to handle multi-valued data items.
		CO4	Make use of packages to generate plots of mathematical functions and equations.
BCS501	Software Engineering & Project Management	CO1	Differentiate process models to judge which process model has to be adopted for the given scenarios.
		CO2	Derive both functional and nonfunctional requirements from the case study.
		CO3	Analyze the importance of various software testing methods and agile methodology.
		CO4	Illustrate the role of project planning and quality management in software development.
		CO5	Identify appropriate techniques to enhance software quality.
BCS502	COMPUTER NETWORKS	CO1	Explain the fundamentals of computer networks.
		CO2	Apply the concepts of computer networks to demonstrate the working of various layers and protocols in communication network.
		CO3	Analyze the principles of protocol layering in modern communication systems.
		CO4	Demonstrate various Routing protocols and their services using tools such as Cisco packet tracer
BCS503	THEORY OF COMPUTATION	CO1	Apply the fundamentals of automata theory to write DFA, NFA, Epsilon-NFA and conversion between them.
		CO2	Prove the properties of regular languages using regular expressions.
		CO3	Design context-free grammars (CFGs) and pushdown automata (PDAs) for formal languages.
		CO4	Design Turing machines to solve the computational problems.
		CO5	Explain the concepts of decidability and undecidability

BAIL504	DATA VISUALIZATION LAB	CO1	Design the experiment to create basic charts and graphs using Tableau and Power BI.
		CO2	Develop the solution for the given real world problem.
		CO3	Analyze the results and produce substantial written documentation
BAI151A	COMPUTER VISION	CO1	Explain the fundamentals of computer vision and its applications.
		CO2	Apply the image enhancement techniques for smoothing and sharpening of images.
		CO3	Compare the different image restoration and segmentation techniques.
		CO4	Demonstrate the smoothing and sharpening techniques for color images.
		CO5	Explain morphological, feature extraction, and pattern classification techniques for object recognition
BAI515B	INFORMATION RETRIEVAL	CO1	Identify the models and the tools for building an Information Retrieval system.
		CO2	Apply query based operations for information retrieval.
		CO3	Use of text based operations for information retrieval from the documents.
		CO4	Apply indexing and searching techniques for information retrieval.
		CO5	Design user interface for search and retrieval of information from the web/documents
BCS515C	UNIX SYSTEM PROGRAMMING	CO1	Demonstrate the basics of Unix concepts and commands.
		CO2	Demonstrate the UNIX file system.
		CO3	Apply comands to reflect changes in file system.
		CO4	Demonstrate IPC and process management.
		CO5	Develop an application/service over a Unix system
BCS515D	DISTRIBUTED SYSTEMS	CO1	Identify the goals and challenges of distributed systems
		CO2	Demonstrate the remote invocation techniques for communication
		CO3	Describe the architecture of distributed file systems and name services
		CO4	Apply clock synchronization algorithms to monitor and order the events.
		CO5	Analyze the performance of mutual exclusion, election and consensus algorithms.
		CO6	Illustrate the fundamental concepts and algorithms related to distributed transactions and replication
BAI515E	EXPLORATORY DATA ANALYSIS	CO1	Demonstrate the application of the NumPy for performing data analysis tasks.
		CO2	Make use of Pandas for various data

			manipulation tasks.
		CO3	Apply advanced data manipulation techniques to real-world datasets.
		CO4	Develop data visualizations using Matplotlib and Seaborn to effectively communicate data insights.
		CO5	Explain the fundamental concepts of machine learning and validation models using Scikit-Learn.
BCS508	Environmental Studies and E-Waste Management	CO1	Comprehend the principles of ecology and environmental issues pertaining to air, land, and water on a global scale.
		CO2	Acquire observation skills for solving problems related to the environment.
		CO3	Conduct survey to describe the realities of waste management system.