

**DEPARTMENT OF
ARTIFICIAL INTELLIGENCE
& MACHINE LEARNING**

2022 REGULATION

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Artificial and machine learning Engineering curriculum is designed to impart knowledge, skill and attitude on the graduates to

PEO1	Graduates of the program will analyze, design and solve problems related to Computer Science and Engineering and possess adaptability to changes in technology by self-learning.
PEO2	Graduates are provided with an educational foundation that prepares them for leadership roles in their diverse career paths and to pursue higher education.
PEO3	Graduates of the program are capable of delivering the software product for various real life problems within the scheduled time.
PEO4	Graduates must develop professional and communication skills for their successful professional career.

Programme Outcomes(POs)

Engineering Graduates will be able to:

PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	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.
PO3	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.

PO4	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.
PO5	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.
PO6	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.
PO7	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.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	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.
PO11	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.
PO12	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.

Programme Specific Outcomes (PSOs)

PSO1	Analyze, design, develop and optimize solutions in Java, C++, .NET Technology and Android based applications.
PSO2	Apply concepts in core areas of Computer Science – Algorithms and Data Structures, Operating Systems, Database Management Systems, Computer Networks, Computer Architecture and Software Engineering to solve technical issues.

**LIST OF COURSES
REGULATION 2022**

SI.NO	SUB.CODE	SUB.NAME
1	BMATS101	ENGINEERING MATHEMATICS FOR CSE STREAM-I
2	BCHES102	CHEMISTRY FOR CSE
3	BCEDK103	COMPUTER AIDED ENGINEERING DRAWING
4	BESCK104B	INTRODUCTION TO ELECTRICAL ENGINEERING
5	BPLCK105B	INTRODUCTION TO PYTHON PROGRAMMING
6	BENGK106	COMMUNICATIVE ENGLISH
7	BKSKK107/BKBKK107	SAMSKRUTHIKA KANNADA/BALAKE KANNADA
8	BSFHK158	SCIENTIFIC FOUNDATION FOR HEALTH
9	BMATS201	ENGINEERING MATHEMATICS FOR CSE STREAM-II
10	BPHYS202	PHYSICS FOR CSE
11	BPOPS203	PRINCIPLES OF PROGRAMMING USING C
12	BESCK204C	INTRODUCTION TO ELECTRONICS COMMUNICATION
13	BETCK205J	INTRODUCTION TO EMBEDDED SYSTEM
14	BPWSK206	PROFESSIONAL WRITING SKILLS IN ENGLISH
15	BICOK207	INDIAN CONSTITUTION
16	BIDTK258	INNOVATION AND DESIGN THINKING (IDT)
17	BCS301	MATHEMATICS FOR COMPUTER SCIENCE
18	BCS302	DIGITAL DESIGN AND COMPUTER ORGANIZATION

19	BCS303	OPERATING SYSTEMS
20	BCS304	DATA STRUCTURES AND APPLICATIONS
21	BCSL305	DATA STRUCTURES LABORATORY
22	BCS306A	OBJECT ORIENTED PROGRAMMING WITH JAVA
23	BSCK307	SOCIAL CONNECT AND RESPONSIBILITY
24	BCS358A	DATA ANALYTICS WITH EXCEL
25	BCS401	ANALYSIS AND DESIGN OF ALGORITHMS
26	BAD402	ARTIFICIAL INTELLIGENCE
27	BCS403	DATABASE MANAGEMENT SYSTEM
28	BCSL404	ANALYSIS AND DESIGN OF ALGORITHMS LAB
29	BCS405A	DISCRETE MATHEMATICAL STRUCTURES

COURSE OUTCOME FOR DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

DEGREE	U.G
PROGRAMME	B.E - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING ENGINEERING
ACADEMIC YEAR	2022-23
REGULATION	2022

FIRST SEMESTER	
1.Course Code and Name: BMATS101 ENGINEERING MATHEMATICS FOR CSE STREAM-I	
CO Statements	
At the end of the course, learners will be able	
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
CO2	analyze the solution of linear and nonlinear ordinary differential equation
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
2.Course Code and Name : BCHES102 CHEMISTRY FOR CSE	
CO Statements	
At the end of the course, learners will be able	
CO1	Identify the terms processes involved in scientific and engineering and applications
CO2	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3	Solve the problems in chemistry that are pertinent in engineering applications
CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5	Analyze properties and multidisciplinary situations processes associated with chemical substances in engineering

3.Course Code and Name: BCEDK103 COMPUTER AIDED ENGINEERING DRAWING	
CO Statements	
At the end of the course, learners will be able	
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.
4.Course Code and Name: BESCK104B INTRODUCTION TO ELECTRICAL ENGINEERING	
CO Statements	
At the end of the course, learners will be able	
CO1	Understand the concepts of various energy sources and Electric circuits.
CO2	Apply the basic Electrical laws to solve circuits
CO3	Discuss the construction and operation of various Electrical Machines.
CO4	Identify suitable Electrical machine for practical implementation.
CO5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.
5.Course Code and Name: BPLCK105B INTRODUCTION TO PYTHON PROGRAMMING	
CO Statements	
At the end of the course, learners will be able	
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.
6.Course Code and Name: BENGK106 COMMUNICATIVE ENGLISH	
CO Statements	
At the end of the course, learners will be able	
CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO3	To impart basic English grammar and essentials of language skills as per present

	requirement.
CO4	Understand and use all types of English vocabulary and language proficiency
CO5	Adopt the Techniques of Information Transfer through presentation
7.Course Code and Name: BSKK107/BKBK107 SAMSKRUTHIKA KANNADA/BALAKE KANNADA	
CO Statements	
At the end of the course, learners will be able	
CO1	To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
CO2	To enable learners to Listen and understand the Kannada language properly.
CO3	To speak, read and write Kannada language as per requirement.
CO4	To train the learners for correct and polite conversation
CO5	To know about Karnataka state and its language, literature and General information about this state.
8.Course Code and Name: BSFK158 SCIENTIFIC FOUNDATION FOR HEALTH	
CO Statements	
At the end of the course, learners will be able	
CO1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
CO2	Develop the healthy lifestyles for good health for their better future.
CO3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life
CO4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
CO5	Prevent and fight against harmful diseases for good health through positive mindset.
SECOND SEMESTER	
11.Course Code and Name: BMATS201 ENGINEERING MATHEMATICS FOR CSE STREAM-II	
CO Statements	
At the end of the course, learners will be able	
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 analyzing the discrete data and solving

	the physical and engineering problems.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB
12.Course Code and Name: BPHYS202 PHYSICS FOR CSE	
CO Statements	
At the end of the course, learners will be able	
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.
13.Course Code and Name: BPOPS203 PRINCIPLES OF PROGRAMMING USING C	
CO Statements	
At the end of the course, learners will be able	
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
14.Course Code and Name: BESCK204C INTRODUCTION TO ELECTRONICS COMMUNICATION	
CO Statements	
At the end of the course, learners will be able	
CO1	Prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
CO2	Equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.
CO3	Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.

15.Course Code and Name: BETCK205J INTRODUCTION TO EMBEDDED SYSTEM	
CO Statements	
At the end of the course, learners will be able	
CO1	Explain characteristics of Embedded System design
CO2	Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS
CO3	Analyse embedded system software and hardware requirements
CO4	Develop programming skills in embedded systems for various applications.
CO5	Design basic embedded system for real time applications
16.Course Code and Name: BPWSK206 PROFESSIONAL WRITING SKILLS IN ENGLISH	
CO Statements	
At the end of the course, learners will be able	
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
17.Course Code and Name: BICOK207 INDIAN CONSTITUTION	
CO Statements	
At the end of the course, learners will be able	
CO1	Analyse the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	Know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.
3.Course Code and Name: BIDTK258 INNOVATION AND DESIGN THINKING (IDT)	
CO Statements	
At the end of the course, learners will be able	
CO1	Appreciate various design process procedure
CO2	Generate and develop design ideas through different technique
CO3	Identify the significance of reverse Engineering to Understand products
CO4	Draw technical drawing for design ideas

THIRD SEMESTER	
1.Course Code and Name : BCS301 MATHEMATICS FOR COMPUTER SCIENCE	
CO Statements	
At the end of the course, learners will be able	
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.
2.Course Code and Name : BCS302 DIGITAL DESIGN AND COMPUTER ORGANIZATION	
CO Statements	
At the end of the course, learners will be able	
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.
3.Course Code and Name : BCS303 OPERATING SYSTEMS	
CO Statements	
At the end of the course, learners will be able	
CO1	Explain the structure and functionality of operating system
CO2	Apply appropriate CPU scheduling algorithms for the given problem.
CO3	Analyze 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
4.Course Code and Name : BCS304 DATA STRUCTURES AND APPLICATIONS	

CO Statements	
At the end of the course, learners will be able	
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.
5.Course Code and Name: BCSL305 DATA STRUCTURES LABORATORY	
CO Statements	
At the end of the course, learners will be able	
CO1	Analyze various linear and non-linear data structures
CO2	Demonstrate the working nature of different types of data structures and their applications themes techniques
CO3	Use appropriate searching and sorting algorithms for the give scenario
CO4	Apply the appropriate data structure for solving real world problems
6.Course Code and Name: BCS306A OBJECT ORIENTED PROGRAMMING WITH JAVA	
CO Statements	
At the end of the course, learners will be able	
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, auto boxing and enumerations in program development
7.Course Code and Name : BCS306B OBJECT ORIENTED PROGRAMMING WITH C++	
CO Statements	
At the end of the course, learners will be able	
CO1	Illustrate the basic concepts of object-oriented programming.
CO2	Design appropriate classes for the given real world scenario.
CO3	Apply the knowledge of compile-time / run-time polymorphism to solve the given problem
CO4	Use the knowledge of inheritance for developing optimized solutions
CO5	Apply the concepts of templates and exception handling for the given problem
CO6	Use the concepts of input output streams for file operations
8.Course Code and Name: BSCK307 SOCIAL CONNECT AND RESPOSIBILITY	
CO Statements	
At the end of the course, learners will be able	
CO1	Communicate and connect to the surrounding.

CO2	Create a responsible connection with the society
CO3	Involve in the community in general in which they work.
CO4	Notice 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. .
CO6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
9.Course Code and Name : BCS358A DATA ANALYTICS WITH EXCEL	
CO Statements	
At the end of the course, learners will be able	
CO1	Use advanced functions and productivity tools to assist in developing worksheets.
CO2	Manipulate data lists using Outline and PivotTables.
CO3	Use Consolidation to summarize and report results from multiple worksheets.
CO5	Apply Macros and Autofilter to solve the given real world scenario.
11.Course Code and Name: BPEK359 PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)	
CO Statements	
At the end of the course, learners will be able	
CO1	Understand the fundamentals of concepts and skills of physical education, health, nutrition and fitness.
CO2	Familiarization of health related exercises, sports for overall growth and development.
CO3	Create a foundation for the professionals in physical education and sports.
CO4	Participate in the competition at regional/state /national/international levels.
CO5	Create consciousness among the students on health, fitness and wellness in developing and maintaining a healthy lifestyle.
11.Course Code and Name: BPEK359 PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)	
CO Statements	
At the end of the course, learners will be able	
CO1	Demonstrate the use of IDLE or PyCharm IDE to create Python Applications.
CO2	Use Python programming constructs to develop programs for solving real-world problems
CO3	Use Matplotlib for drawing different Plots
CO4	Demonstrate working with Seaborn, Bokeh for visualization.
CO5	Use Plotly for drawing Time Series and Maps.

SEMESTER 4	
13.Course Code and Name : BCS401 ANALYSIS & DESIGN OF ALGORITHMS	
CO Statements	
At the end of the course, learners will be able	
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	Analyze various classes (P, NP and NP Complete) of problems.
CO6	Illustrate backtracking, branch & bound and approximation methods.
14.Course Code and Name : BCS402 MICROCONTROLLERS	
CO Statements	
At the end of the course, learners will be able	
CO1	Explain the ARM Architectural features and Instructions.
CO2	Develop programs using ARM instruction set for an ARM Microcontroller.
CO3	Explain C-Compiler Optimizations and portability issues in ARM Microcontroller.
CO4	Apply various Structured Query Language (SQL) statements for database manipulation.
CO5	Demonstrate the role of Cache management and Firmware in Microcontrollers.
15.Course Code and Name : BCS403 DATABASE MANAGEMENT SYSTEM	
CO Statements	
At the end of the course, learners will be able	
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.
CO4	Analyze various normalization forms for the given application.
CO5	Develop database applications for the given real world problem.
CO6	Understand the concepts related to NoSQL databases.
16.Course Code and Name : BCS405A DISCRETE MATHEMATICAL STRUCTURES	
CO Statements	
At the end of the course, learners will be able	
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.
17.Course Code and Name : BCS405B GRAPH THEORY	
CO Statements	
At the end of the course, learners will be able	
CO1	Explain the fundamental concepts of properties and representation of graphs.
CO2	Solve the problems involving characterization and operations on graphs.
CO3	Apply concepts of trees and graph connectivity to solve real world problems.
CO4	Apply the concepts of planar graph and graph representations to solve the given problem.
CO5	Use the concepts of matching and coloring of graphs to solve the real world problems
18.Course Code and Name : BCS405C OPTIMIZATION TECHNIQUE	
CO Statements	
At the end of the course, learners will be able	
CO1	Explain the fundamental concepts of properties and representation of graphs.
CO2	Solve the problems involving characterization and operations on graphs.
CO3	Apply concepts of trees and graph connectivity to solve real world problems.
CO4	Apply the concepts of planar graph and graph representations to solve the given problem.
CO5	Use the concepts of matching and coloring of graphs to solve the real world problems
7.Course Code and Name : BCS405D LINEAR ALGEBRA	
CO Statements	
At the end of the course, learners will be able	
CO1	Explain the concepts of vector spaces, subspaces, bases, dimension and their properties.
CO2	Use matrices and linear transformations to solve the given problem.
CO3	Compute Eigenvalues and Eigenvectors for the linear transformations
CO4	Determine orthogonality of inner product spaces.
CO5	Apply the optimization techniques to solve the problems

