

M.S. Ramaiah University of Applied Sciences

New BEL Road, MSR Nagar, Bangalore – 560054



**RAMAIAH
UNIVERSITY**
OF APPLIED SCIENCES

PO, PSO, PEO & CO

Programme: B. Tech. In Information Science and Engineering

Programme Code: 411

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Program Educational Objectives (PEO)

Course Outcomes (CO)

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

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

Approved in 23rd ACM (Resolution 23.05) held on 15th July 2021

Faculty of Engineering and Technology (FET)

Programme Name: B. Tech. (Information Science and Engineering)

Programme Outcomes (POs)

B. Tech. graduates will be able to:

- PO-1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
- PO-2. Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiate d conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO-3. 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. 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. 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. 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. 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. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- PO-9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- PO-10. 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. 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. 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


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Programme Specific Outcomes (PSOs)

At the end of the B. Tech. (Information Science and Engineering) Programme, the graduate will be able to:

- PSO-1. Apply principles and best practices in design of efficient algorithms and correct programs; build reliable, secure and robust software, making use of knowledge of computer architecture, systems software, networking, Web technologies distributed computing
- PSO-2. Use knowledge gained in both breadth courses in science and engineering and depth courses in mathematics and computing, solving problems of relevance to society, industry and R&D in an innovative manner
- PSO-3. Engage in lifelong learning by applying knowledge of fields of computer science and refining it and evangelizing applications and technologies to all interested communities

Program Educational Objectives (PEOs)

The objectives of the B. Tech. (Information Science and Engineering) Programme are to:

- PEO-1. Provide students with a strong foundation in mathematics and computing along with breadth and foundational requirement in computing, science, engineering and humanities to enable them to devise and deliver efficient and safe solutions to challenging problems in Computer Science and inter-disciplinary areas
- PEO-2. Impart analytic and cognitive skills required to develop innovative solutions for R&D, to build creative, dependable and safe products for Industry based on dynamic societal requirements motivated and nurtured by sound theoretical and practical knowledge of time tested and long lasting principles of computer science, current tools and technologies
- PEO-3. Develop managerial and entrepreneurial skills inculcating strong human values along with social, interpersonal and leadership skills required for professional success in evolving global professional environments

Course Outcomes (COs)

Course Title & Code: Engineering Mathematics - 1 (MTB101A)

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

- CO-1. State and discuss basic concepts related to single, two variable calculus and matrix algebra
- CO-2. Perform basic operations of matrix algebra and apply them to solve systems of linear equations
- CO-3. Solve simple mathematical problems associated with linear algebra, single and two variable calculus
- CO-4. Demonstrate competence with the basic ideas of linear systems, independence, bases and dimension, linear transformations, eigenvalues, eigenvectors and diagonalization
- CO-5. Solve complex real-world problems associated with linear algebra, single and two variable calculus



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Course Outcomes (COs)

Course Title & Code: Engineering Physics and Laboratory (PYB102A)

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

- CO-1. State, explain the concepts of mechanics, electrical conductivity, quantum mechanics, crystal structure and material science, laser and fiber optics
- CO-2. Derive standard relationships in mechanics, electrical conductivity, quantum mechanics, crystal structure and material science, laser & fiber optics, and interpret them
- CO-3. Discuss the applications of mechanics, electrical conductivity, quantum mechanics, crystal structure and material science, laser and fiber optics
- CO-4. Solve problems in mechanics, electrical conductivity, quantum mechanics, crystal structure, material science, laser and fiber optics
- CO-5. Plan the experimental set-up, conduct experiments, calculate and plot the graphs to obtain the results and write a laboratory report as per the prescribed format.

Course Outcomes (COs)

Course Title & Code: Engineering Mechanics (CEF101A)

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

- CO-1. State and describe the laws of Statics, Friction and Dynamics and their contexts of application.
- CO-2. Interpret standard mathematical relationships and apply for solving simple static and dynamic problems in engineering mechanics
- CO-3. Calculate moment of inertia, determine centroid, centre of gravity for the structural members
- CO-4. Apply the laws of statics and dynamics for the equilibrium analysis of rigid bodies with and without friction
- CO-5. Apply energy methods in analyzing of static and dynamic aspects of engineering structures made of rigid bodies

Course Outcomes (COs)

Course Title & Code: Elements of Electronics Engineering and Laboratory (ECF102A)

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

- CO-1. Explain working principles of PN junction diode, Zener diode, transistors, amplifier configurations, Op-Amps, power supply, logic gates and electronic displays
- CO-2. Derive mathematical relationships for electronic devices and circuits
- CO-3. Solve simple numerical and design problems related to analog / digital circuits as well as devices
- CO-4. Design and analyse operation of standard analog / digital circuits for a given application
- CO-5. Conduct experiments as per the standard procedures and tabulate/calculate/plot the measured values
- CO-6. Interpret and compare with standard results, and draw conclusions and Write report as per the prescribed format


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M.S. Ramaiah University of Applied Sciences
Bangalore-560058



Course Outcomes (COs)

Course Title & Code: Engineering Drawing (MEF103A)

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

- CO-1. Describe the conventions used in projections of geometric entities and interpret the same
- CO-2. Draw orthographic projections for the geometric entities in specified positions
- CO-3. Develop lateral surfaces of un-sectioned and sectioned regular solids
- CO-4. Develop orthographic projections for given applications
- CO-5. Draw isometric projections for the solids and their combinations
- CO-6. Demonstrate competency in using CAD tool for drawing projections of geometric entities

Course Outcomes (COs)

Course Title & Code: Constitution, Human Rights and Law (LAN101A)

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

- CO-1. Explain the key principles of the Indian Constitution
- CO-2. Explain Indian legal system and judicial structure that govern the citizens
- CO-3. Discuss UN Declaration of Human Rights
- CO-4. Discuss the scope and application of Human Rights Principles and Law
- CO-5. Suggest strategies for protection of human rights and resolving legal issues in compliance with applicable laws

Course Outcomes (COs)

Course Title & Code: Engineering Mathematics - 2 (MTB102A)

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

- CO-1. Describe the fundamentals of ordinary differential equations and Laplace transform
- CO-2. Solve standard forms of ordinary differential equations
- CO-3. Solve simple problems in ordinary differential equations and Laplace transform
- CO-4. Model real world problems using ordinary differential equations and solve complex problems associated with ordinary differential equations using Laplace transform
- CO-5. Apply Laplace transform in solving complex real world engineering problems

Course Outcomes (COs)

Course Title & Code: Engineering Chemistry and Laboratory (CYB104A)

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

- CO-1. Explain the basic concepts of electrochemistry, conversion of chemical energy into electrical energy, theory of corrosion and principles of metal finishing
- CO-2. Differentiate renewable - nonrenewable fuels, primary - secondary electrodes & primary - secondary batteries, batteries - fuel cells, electroplating – electroless plating, thermosetting – thermoplastic polymers and dry corrosion - wet corrosion
- CO-3. Discuss the reaction chemistry and stoichiometry of combustion of fuels, remedial measures to control oxides of nitrogen, sulphur and carbon, polymerization – methods, mechanism, preparation, properties and applications of some polymers, concepts of nano science and nanotechnology


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

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- CO-4. Identify the types of corrosion and methods to prevent corrosion, suitable polymers and nanocomposite materials for engineering applications
- CO-5. Derive kinetic rate equations for various chemical systems and equation for electromotive force
- CO-6. Analyze the suitability of polymers & composites for various applications and solve problems related to storage devices, chemical kinetics, electro chemistry, corrosion and metal finishing
- CO-7. Plan the experimental set up, conduct experiments, calculate and plot the graphs to obtain results, and write a laboratory report as per the prescribed format

Course Outcomes (COs)

Course Title & Code: Elements of Mechanical Engineering and Workshop Practice (MEF104A)

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

- CO-1. Demonstrate the understanding on Classification of energy sources, energy conversion systems, mechanical power transmission systems, machine tools and processes
- CO-2. Describe various energy conversion systems, mechanical power transmission systems and machine tools
- CO-3. Explain the working principle of refrigeration systems, biomass conversion technologies and machining operations
- CO-4. Solve numerical problems on IC engines and mechanical power transmission systems
- CO-5. Apply principles of energy conversion systems, power transmission systems, machining processes and mechanical joints to practical applications

Course Outcomes (COs)

Course Title & Code: Elements of Electrical Engineering and Laboratory (EEF105A)

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

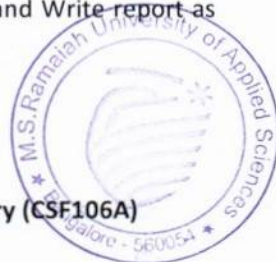
- CO-1. State and explain various laws of electric circuits, magnetic circuits and their significance, phasor diagrams for electrical elements
- CO-2. Explain construction, principle of operation, working and characteristics of DC machines, transformers, AC rotating machines and their applications
- CO-3. Derive equations for electrical circuits, magnetic circuits and performance of various AC and DC machines
- CO-4. Solve problems on electric circuits, magnetic circuits, DC machines, transformers and AC rotating machines
- CO-5. Conduct experiments as per the standard procedures and tabulate/calculate/plot the measured values
- CO-6. Interpret and compare with standard results, and draw conclusions and Write report as per the prescribed format

Course Outcomes (COs)

Course Title & Code: Elements of Computer Science and Engineering and Laboratory (CSF106A)

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

- CO-1. Describe the elements and methodology of Computer Science and Engineering



- CO-2. Explain the basic principles and techniques of algorithms and programming
- CO-3. Select appropriate approach to solve a computational problem
- CO-4. Design an algorithmic solution and draw a flow chart of the solution
- CO-5. Develop computer programs for moderately complex problems
- CO-6. Test and validate developed computer programs

Course Outcomes (COs)

Course Title & Code: Professional Communication (TSN101A)

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

- CO-1. Apply the concepts of grammar for communication
- CO-2. Compose precise paragraphs
- CO-3. Demonstrate professional etiquette
- CO-4. Demonstrate appropriate verbal and non-verbal communication in the given context
- CO-5. Develop professional written document

Course Outcomes (COs)

Course Title & Code: Engineering Mathematics - 3 (MTF201A)

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

- CO-1. State and explain the important theorems in Fourier series, transforms and vector integral calculus
- CO-2. Solve simple problems in Fourier series, transforms and vector calculus
- CO-3. Apply Fourier series, transforms and vector calculus in solving complex real world engineering problems
- CO-4. Implement the programs to solve system of linear equations and non-linear equations of single variable using MATLAB
- CO-5. Apply interpolation and numerical integration method in analyzing some real world problems

Course Outcomes (COs)

Course Title & Code: Discrete Mathematics (CSC201A)

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

- CO-1. Describe the concepts and theories of sets, logic, integer arithmetic and algebraic structures Classify and describe types of digital circuits
- CO-2. Explain the principles and applications of set theory, logic, integer arithmetic and abstract algebra
- CO-3. Apply set theory, logic, integer arithmetic and abstract algebra to solve a given problem
- CO-4. Develop models of computing systems using logical and algebraic structures for given application
- CO-5. Analyze the properties and behavior of algorithms, programs and computing systems using logical and algebraic constructs



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Bangalore-560058

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Course Outcomes (COs)

Course Title & Code: Data Structures Foundation (CSD201A)

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

- CO-1. Describe Linear and Non- Linear data structures such as Stacks, Queues, Linked Lists and Trees
- CO-2. Explain the approaches used to implement the data structures
- CO-3. Discuss the working of standard data access and manipulation algorithms
- CO-4. Implement Stacks, Queues, Linked Lists and Trees
- CO-5. Recommend a suitable data structure and algorithm for modeling a given scenario
- CO-6. Develop computer programs using data structures to solve moderately complex problems

Course Outcomes (COs)

Course Title & Code: Logic Design (CSD202A)

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

- CO-1. Describe the elements of switching and digital design
- CO-2. Explain the principles and techniques of sequential and combinational logic circuits
- CO-3. Apply principles of sequential and combinational logic to design digital circuits
- CO-4. Analyze and optimize digital logic circuits
- CO-5. Design the digital components of a computer using digital logic circuits
- CO-6. Test and validate digital logic circuits

Course Outcomes (COs)

Course Title & Code: Elements of Information Science (ISC201A)

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

- CO-1. Discuss paradigms of information science and to explain domain analysis with examples; to explain role of information systems in business
- CO-2. Apply techniques of information organization; to discuss information technologies in creation, dissemination and retrieval of information
- CO-3. Discuss about Data, Databases and Database Management
- CO-4. Explain and analyze information networks and to integrate organizations
- CO-5. Explain informatics
- CO-6. Discuss methods of communication of information

Course Outcomes (COs)

Course Title & Code: Innovation and Entrepreneurship (BAU201A)

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

- CO-1. Explain the concepts and process of Innovation as well as entrepreneurship
- CO-2. Construct and apply the idea generation techniques
- CO-3. Discuss the opportunities for launching of new venture and various entry strategies
- CO-4. Examine innovative ideas for the creation and management of entrepreneurship
- CO-5. Formulate and present a viable business plan to the investors' appraisal

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Course Outcomes (COs)

Course Title & Code: Python and Data Structures Laboratory (CSC204A)

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

- CO-1. Identify fundamental data structures and algorithms to solve a given problem
- CO-2. Illustrate the working of different data structures
- CO-3. Develop algorithms and programs to solve a given problem using appropriate data structures
- CO-4. Design and develop solution for efficient sorting and searching operations
- CO-5. Evaluate the empirical performance of implemented data structures and algorithms
- CO-6. Document work done and prepare a laboratory report

Course Outcomes (COs)

Course Title & Code: Additional Mathematics - 1

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

- CO-1. State and explain the important theorems and solve simple mathematical problems in one variable calculus and vector algebra
- CO-2. State theorems and solve simple problems in two variable calculus
- CO-3. Solve complex real world problems associated with one and two real analysis
- CO-4. Illustrate fundamentals of MATLAB programming and write simple programs
- CO-5. Solve complex mathematical problems associated with linear algebra and compare the results with that of solutions obtained using MATLAB

Course Outcomes (COs)

Course Title & Code: Engineering Mathematics – 4 (MTF202A)

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

- CO-1. Define and explain the concepts of correlation, regression, random variables, probability distribution, partial differential equations and complex analysis
- CO-2. State theorems and solve simple problems in partial differential equations, complex analysis, probability, probability distributions
- CO-3. Apply numerical methods to solve ordinary and partial differential equations using MATLAB
- CO-4. Solve complex engineering problems associated with numerical methods using MATLAB
- CO-5. Analyze real world problems associated with probability, probability distributions, partial differential equations and complex analysis
- CO-6. Construct the Bar chart, pie chart, Histogram, Box-plot and fitting of curves by using MATLAB

Course Outcomes (COs)

Course Title & Code: Software Development Fundamentals (CSC203A)

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

- CO-1. Describe the concepts of requirements analysis, architectural design, program design, testing, and maintenance of software



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

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- CO-2. Explain the principles of software development and maintenance Solve simple problems on logic design and function minimization
- CO-3. Apply the principles of software development to engineer software
- CO-4. Analyze requirements and suggest a design strategy for software development
- CO-5. Design, develop and test software for a given set of requirements
- CO-6. Evaluate software implementations for conformance with requirements adopting quality assurance practices

Course Outcomes (COs)

Course Title & Code: Programming Paradigms (CSD207A)

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

- CO-1. Describe and distinguish the concepts and features of various programming paradigms
- CO-2. Discuss the features of functional, object oriented and event driven programming paradigms
- CO-3. Apply concepts of functional, object oriented and event driven programming
- CO-4. Analyze the usefulness of a programming paradigms based on ease of expression and scale of development effort
- CO-5. Design software applications using functional, object oriented and event driven approaches
- CO-6. Synthesize software applications using functional, object oriented and event driven approaches

Course Outcomes (COs)

Course Title & Code: Design and Analysis of Algorithms (CSD206A)

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

- CO-1. Describe the concepts of design of algorithms
- CO-2. Explain the principles of analysis of algorithms
- CO-3. Choose appropriate techniques for design and analysis of algorithms for a given problem
- CO-4. Analyze the worst case and average case complexity of a given algorithm
- CO-5. Design efficient algorithms for a given problem
- CO-6. Compare algorithms based on appropriately chosen measures of complexity

Course Outcomes (COs)

Course Title & Code: Advanced Data Structures (CSC202A)

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

- CO-1. Use the control structures of language C along with the data types
- CO-2. Explain the approaches used to implement data structures in C including the feature of dynamic memory allocation Solve simple problems on logic design and function minimization
- CO-3. Implement various sort algorithms using language C highlighting data structure representation
- CO-4. Implement various search algorithms using language C highlighting data structure representation
- CO-5. Implement text processing algorithms in language C highlighting data structures



- CO-6. Develop computer programs using language C with the right choice of control structures and various features of the language

Course Outcomes (COs)

Course Title & Code: Formal Languages and Automata Theory (CSL201A)

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

- CO-1. Describe formal languages, automata and models of computation
- CO-2. Explain formal relationships among machines, languages and grammars
- CO-3. Analyze a given language for arriving at a suitable model of computation
- CO-4. Apply automata theory to prove or disprove languages
- CO-5. Design a grammar generating a given language and a computing machine that accepts it

Course Outcomes (COs)

Course Title & Code: Environmental Studies (BTN101A)

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

- CO-1. Illustrate the multidisciplinary nature of environmental studies and recognize the need for public awareness
- CO-2. Explain the various natural resources and their associated problems, ecosystem, and environmental pollution
- CO-3. Analyse the concept of ecosystem and classify various types
- CO-4. Compare biodiversity at local, national and global levels
- CO-5. Discuss various social issues pertaining to environment including sustainable development and energy issues

Course Outcomes (COs)

Course Title & Code: Software Development Laboratory (CSL202A)

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

- CO-1. Relate software engineering methods to the respective phases of software development, building and testing
- CO-2. Explain the process and methodology of creating architecture and refinement to program design based on software requirements
- CO-3. Use Java, C or any programming language to implement the program design following recommended coding guidelines, best practices and build conventions
- CO-4. Analyze requirements and program design and create a test case specification
- CO-5. Design and implement test cases based on test specifications
- CO-6. Create a report documenting the software development activities

Course Outcomes (COs)

Course Title & Code: Programming Paradigms Laboratory (CSD208A)

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

- CO-1. Relate the concepts of programming paradigm with the constructs of the programming language



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

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- CO-2. Express the model of an application as a program in functional and object-oriented programming languages
- CO-3. Apply event handling and exception handling techniques in programs
- CO-4. Analyze a given application and suggest programming approach and language based on ease of expression and scale of development
- CO-5. Evaluate the usefulness of a programming approach and language for a given application requirement
- CO-6. Document work done and prepared a laboratory report

Course Outcomes (COs)

Course Title & Code: Additional Mathematics – 2

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

- CO-1. Describe the fundamentals of ordinary differential equations State theorems and solve simple problems in two variable calculus
- CO-2. Solve standard forms of ordinary differential equations Illustrate fundamentals of Linear algebra
- CO-3. Model real world problems using ordinary differential equations and solve complex problems associated with ordinary differential equations
- CO-4. Apply numerical methods to solve nonlinear equations in one variable, system of linear equations, interpolation and numerical quadrature, and implement the same using MATLAB
- CO-5. Solve complex problems associated with nonlinear equations and linear systems, interpolation and numerical integration using MATLAB

Course Outcomes (COs)

Course Title & Code: Data Mining (CSC302A)

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

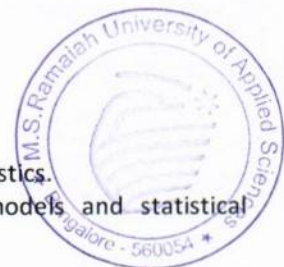
- CO-1. Describe the conceptual framework of classification and clustering
- CO-2. Explain the principles of supervised and unsupervised learning algorithms, training and test data
- CO-3. Apply machine learning techniques to solve problems of practical importance
- CO-4. Analyse the given data using classification and clustering algorithms
- CO-5. Synthesise and solve data mining problems of practical importance using theoretical analysis and software tools

Course Outcomes (COs)

Course Title & Code: Probability and Statistics (MTE301A)

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

- CO-1. Describe the basic concepts and techniques of Probability and Statistics.
- CO-2. Explain the principles and applications of basic probability models and statistical techniques
- CO-3. Develop probabilistic and statistical models for a given application
- CO-4. Solve and analyse probabilistic and statistical models
- CO-5. Apply probability models and statistical techniques to solve a complex problem



00
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 M.S. Ramaiah University of Applied Sciences
 Bangalore - 560054

Course Outcomes (COs)

Course Title & Code: Database Systems (CSC302A)

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

- CO-1. Describe the concepts, design and applications of database systems
- CO-2. Explain the principles of data modelling, querying, storage, transactions and optimization of database systems
- CO-3. Analyse the schema and use appropriate normalization techniques for relational databases
- CO-4. Develop queries using query languages for a given database system
- CO-5. Apply principles of database systems to model data and create queries
- CO-6. Design and implement an efficient database system and interface it with a given application

Course Outcomes (COs)

Course Title & Code: Computer Networks (CSD301A)

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

- CO-1. Describe the protocols that operate in the TCP/IP stack and Wireless networks
- CO-2. Explain the typical applications of computer networks along with the protocols and security considerations
- CO-3. Choose appropriate network protocols for given applications
- CO-4. Compare and analyze different wired and wireless network protocols for given application requirements
- CO-5. Design different types of servers using appropriate transport layer protocols based on application requirements
- CO-6. Synthesize client-server based computer networks using the sockets API

Course Outcomes (COs)

Course Title & Code: Operating Systems (CSC304A)

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

- CO-1. Explain operating system and its services
- CO-2. Describe concepts associated with process management, memory management, Inter process communication, input/output devices and file systems
- CO-3. Apply the concepts and principles of operating systems to design operating system services for applications
- CO-4. Analyse and synthesise operating system services for applications
- CO-5. Evaluate the performance of operating system services for applications
- CO-6. Design and validate operating system services for applications

Course Outcomes (COs)

Course Title & Code: Microprocessors and Architecture (CSD203A)

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

- CO-1. Describe the architecture of CPU, memory and I/O subsystems
- CO-2. Explain the concepts and working of computer architectural subsystems

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



- CO-3. Apply concepts of architecture to design simple architectural components
- CO-4. Analyze, test and validate simple processor design
- CO-5. Design the main functional units of architectural subsystems
- CO-6. Select appropriate architectural features for a given application

Course Outcomes (COs)

Course Title & Code: Bioinformatics (ISC301A)

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

- CO-1. Explain the basics of bioinformatics and sequence analysis
- CO-2. Identify, analyze and solve biological issues using Bioinformatics approaches
- CO-3. Apply sequence-based and structure-based Bioinformatics approaches in the context of genomics, proteomics, and metabolomics
- CO-4. Develop applications to solve biological problems by utilizing bioinformatics
- CO-5. use cutting-edge bioinformatics tools/methods to solve problems

Course Outcomes (COs)

Course Title & Code: Database Systems Laboratory (CSL302A)

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

- CO-1. Describe the components of database systems
- CO-2. Explain the principles of database design and implementation
- CO-3. Design a database system for a given application
- CO-4. Implement a database using DBMS and interface it with an application
- CO-5. Test and validate the developed database system
- CO-6. Create a laboratory report documenting the work

Course Outcomes (COs)

Course Title & Code: Operating Systems Laboratory (CSL303A)

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

- CO-1. Explain operating system and its services
- CO-2. Describe concepts associated with process management, memory management, Inter process communication, input/output devices and file systems
- CO-3. Apply the concepts and principles of operating systems to design operating system services for applications
- CO-4. Analyse and synthesise operating system services for applications
- CO-5. Simulate and validate operating system services for applications
- CO-6. Create a technical report documenting the laboratory work



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 M.S. Ramaiah University of Applied Sciences
 Bangalore - 560058

Course Outcomes (COs)

Course Title & Code: Microprocessors Laboratory (CSL205A)

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

- CO-1. Describe the elements of assembly language programming
- CO-2. Discuss the various tools and techniques used for assembly language programming



- CO-3. Apply assembly language constructs to optimize C programs
- CO-4. Synthesize programs using inline assembly statements in C
- CO-5. Analyze, test and validate developed assembly programs
- CO-6. Document work done and prepare a laboratory report

Course Outcomes (COs)

Course Title & Code: Principles of Artificial Intelligence (AID201A)

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

Course Outcomes (COs)

Course Title & Code: Information Security and Protection (CSC306A)

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

- CO-1. Describe elements and components of information security and protection
- CO-2. Describe security attacks and defense mechanisms
- CO-3. Explain the requirements, principles and models of security policies
- CO-4. Analyze the security properties of a given model
- CO-5. Analyze a given scenario, application or system and recommend appropriate security policies and mechanisms
- CO-6. Develop security policies and mechanisms for a given scenario, application or system

Course Outcomes (COs)

Course Title & Code: Web Architecture and Application Development (CSC307A)

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

- CO-1. Describe the evolution of Web technologies, related software architectural patterns and frameworks
- CO-2. Explain in detail the layers, components and mechanisms related to Web applications
- CO-3. Describe the different software architectures and its applicable domains
- CO-4. Apply knowledge of Web technologies, patterns and frameworks to create efficient applications for given scenarios
- CO-5. Design simple, efficient, scalable web applications using appropriate patterns, technologies, languages and frameworks
- CO-6. Analyze the efficiency, ease of use and scalability of frameworks for a given scenario



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



Course Outcomes (COs)

Course Title & Code: Data Processing (ISC302A)

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

- CO-1. Describe the elements of data processing methodology employed in contemporary data science
- CO-2. Explain the principles of data processing techniques, tools, frameworks and algorithms
- CO-3. Choose appropriate data processing techniques, frameworks and tools for a given data science application
- CO-4. Apply data processing techniques, frameworks and tools to design a data processing workflow
- CO-5. Synthesize a data processing workflow
- CO-6. Demonstrate the effectiveness of a data processing workflow on application data

Course Outcomes (COs)

Course Title & Code: Seminar (CSS301A)

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

- CO-1. Demonstrate the understanding of Selection of relevant Topics for Presentations
- CO-2. Get exposed to the Collection of Material, Reading and Comprehension
- CO-3. Learn to make a Report in a given format and Prepare Presentation on the Report
- CO-4. Get into Facing an Audience while presenting their Work and managing a Q&A Session

Course Outcomes (COs)

Course Title & Code: Data Processing Laboratory (ISL301A)

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

- CO-1. Identify and choose appropriate data set and deal with data in various formats
- CO-2. To choose appropriate data processing techniques, frameworks and tools for a structured data
- CO-3. To design a data processing application for structured data using suitable techniques, frameworks and tools
- CO-4. To analyze structured data using a data processing workflow
- CO-5. To evaluate alternative solutions to a data processing problem
- CO-6. Document work done and prepare a laboratory report

Course Outcomes (COs)

Course Title & Code: Artificial Intelligence Laboratory (AID202A)

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

- CO-1. Describe the process of modelling, design and synthesis of artificial intelligence applications
- CO-2. Explain the principles of artificial intelligence and intelligent agents
- CO-3. Apply the principles of knowledge representation, search strategies, learning, reasoning and planning to design intelligent agents

Dean



- CO-4. Analyze a scenario and identify methods 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

Course Outcomes (COs)

Course Title & Code: Web Architecture and Application Development Laboratory (CSL304A)

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

- CO-1. Relate the patterns and generic web technologies with frameworks, libraries and implementations provided in Java programming language
- CO-2. Translate architectural design to an object oriented design in UML
- CO-3. Apply Java Web technologies to design and implement a Web application
- CO-4. Analyze the design and scale of a Web application for appropriate Web frameworks and technology implementations
- CO-5. Implement Web applications using Java Web frame works and technology
- CO-6. Evaluate the appropriateness of Web technology and frameworks for a given application scenario

Course Outcomes (COs)

Course Title & Code: Project Work-1 (CSP401A)

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

- CO-1. Recognize the need for developing a new or improving an existing engineering product/system through an organized survey of literature and requirement analysis
- CO-2. Define engineering design specifications based on the software requirements specification
- CO-3. Design, model, synthesize, analyze the solution 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 project report

Course Outcomes (COs)

Course Title & Code: Internship (CSI401A)

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

- CO-1. Understand the Process Stock of the Industry
- CO-2. Gain experience of the Process Stock by working on an ongoing Project in the Industry
- CO-3. Learn to manifest the work done in the form of a Report in a given format.
- CO-4. Get experienced on Presenting the Work Done and Facing an Audience while presenting their Work.


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



Course Outcomes (COs)

Course Title & Code: Project Work-2 (CSP402A)

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 and requirement analysis
- CO-2. Define engineering design specifications based on the software requirements specification
- CO-3. Design, model, synthesise, analyse the solution 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 project report

Course Outcomes (COs)

Course Title & Code: Computer Vision (CSC309A)

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. To Discuss Image processing Techniques
- CO-3. Analyze 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 world.
- CO-5. Apply classification, clustering algorithms for a given computer vision application
- CO-6. Implement machine learning algorithms for computer vision applications

Course Outcomes (COs)

Course Title & Code: Text Mining (ISE402A)

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

- CO-1. E 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: Computational Intelligence (CSE408A)

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

- CO-1. Discuss the terms and concepts related to fuzzy systems, evolutionary computation, swarm intelligence and artificial immune systems
- CO-2. Analyze whether a specific engineering problem can be solved using a CI approach



- CO-3. Compare and contrast different CI techniques used to achieve particular functionalities
- CO-4. Recommend the most suitable CI technique to address a specific engineering problem
- CO-5. Specify, implement, customize and evaluate typical CI algorithms to solve a practical problem
- CO-6. Develop variants and hybrids of the typical CI algorithms

Course Outcomes (COs)

Course Title & Code: Natural Language Processing (CSC310A)

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: Semantic Web Technologies (ISE403A)

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

- CO-1. Explain the concept structure of the Semantic Web technology and how this technology Revolutionizes the World Wide Web and its uses.
- CO-2. Describe the concepts of metadata, semantics of knowledge and resource, ontology, and their Descriptions in XML-based syntax and web ontology language (OWL). Describe logic semantics and inference with OWL.
- CO-3. Use Semantic Web query languages (SPARQL).
- CO-4. Use ontology engineering approaches in semantic applications
- CO-5. Program semantic applications with Java and Jena API

Course Outcomes (COs)

Course Title & Code: Software Architecture (CSE301A)

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

- CO-1. Explain the concept of software architecture and design patterns
- CO-2. Describe the principle behind software patterns and application of fundamental patterns
- CO-3. Summarize the need for software architecture and principles of classical architectural styles
- CO-4. Outline the major approaches to integrate patterns into software design
- CO-5. Apply software design patterns for various practical scenarios



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

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Course Outcomes (COs)

Course Title & Code: Principles and Practices of Software Testing (CSE405A)

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

- CO-1. Explain unit, integration and system test phases along with the nature of defects that the respective phases can detect
- CO-2. Illustrate the process of designing tests for software program validation using functional testing techniques such as equivalence class partitioning, boundary value analysis and decision tables ensuring test adequacy
- CO-3. Design tests for software program validation using structural and data-flow testing techniques satisfying coverage criteria
- CO-4. Apply appropriate testing methods to validate Graphical User Interface based software
- CO-5. Apply test methodologies including model-based testing for validation of object oriented software at different levels
- CO-6. Apply test-driven development methods to create software programs

Course Outcomes (COs)

Course Title & Code: Service Oriented Architecture (CSE407A)

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

- CO-1. Intended Learning Outcome
- CO-2. Explain software oriented architectures
- CO-3. Design medium scale software project development using SOA principles
- CO-4. Develop SOA messages from business use cases
- CO-5. Design and implementation of modern SOA and SOA-specific methodologies, technologies and standards
- CO-6. Create composite services by applying composition style

Course Outcomes (COs)

Course Title & Code: Principles and Practices of Cryptography (CSE302A)

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

- CO-1. Describe techniques used for confidentiality and integrity in computing systems
- CO-2. Discuss the importance, working and application of techniques to ensure confidentiality and integrity
- CO-3. Compare and choose appropriate cryptographic techniques for a given scenario.
- CO-4. Identify confidentiality and integrity issues in code review and suggest appropriate countermeasures
- CO-5. Design secure applications using appropriate cryptographic techniques
- CO-6. Develop security subsystems using appropriate cryptographic techniques



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

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Course Outcomes (COs)

Course Title & Code: Quantum Computing (MCC309A)

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

- CO-1. Describe the quantum mechanical, computational and information theoretical concepts underlying quantum computing
- CO-2. Describe the concepts of quantum computation, quantum circuits and quantum information theory
- CO-3. Explain the architectural and programming principles of quantum computing
- CO-4. Explain the principles of quantum algorithms and their applications
- CO-5. Analyse simple quantum computing circuits and algorithms
- CO-6. Design quantum algorithms for a given application

Course Outcomes (COs)

Course Title & Code: Blockchain Technologies (ISE405A)

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

- CO-1. Discuss about Blockchain technologies and evolution
- CO-2. Explain smart contracts
- CO-3. To discuss Components and Structure of Blockchain
- CO-4. To compare and contrast decentralized and distributed systems
- CO-5. To explain security principles behind blockchain
- CO-6. To discuss achieving consensus in the design of blockchain applications

Course Outcomes (COs)

Course Title & Code: Advanced Mathematics (MTE302A)

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

- CO-1. Define and explain Legendre and Bessel differential equation, curvature, torsion, geodesics, manifolds and tensors
- CO-2. State the results and theorems and solve simple problems in Legendre differential equations, Bessel differential equation, theory of curves and surfaces
- CO-3. Apply differential geometry techniques to compute Gaussian curvature, mean curvature, principal curvature and torsion
- CO-4. Solve complex engineering problems associated with Bessel differential equation, theory of curves and surfaces, orthogonal curvilinear coordinates and spherical curvilinear system
- CO-5. Analyze real world problems associated with Bessel differential equation and curvature of space curves


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M.S. Ramaiah University of Applied Sciences
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Course Outcomes (COs)

Course Title & Code: Optimization Techniques (MTE401A)

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

- CO-1. Describe fundamentals of convex and concave functions, linear programming and constraint nonlinear optimization
- CO-2. State and explain important classical techniques and numerical methods of constraint optimization
- CO-3. Demonstrate the skill to analyze a problem by choosing effective optimization tools
- CO-4. Apply optimization techniques to model real world problems
- CO-5. Solve complex problems associated with linear programming and constraint optimization of function of several variables

Course Outcomes (COs)

Course Title & Code: Advanced Numerical Methods (MTE403A)

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

- CO-1. Illustrate various methods of numerical computation of Eigen values
- CO-2. Illustrate various methods to solve partial differential equations
- CO-3. Apply numerical methods to solve partial differential equations using MATLAB
- CO-4. Analyze real world problems associated with computing eigenvalues and partial differential equations
- CO-5. Solve complex problems arising in real world using finite volume and finite elements methods to solve partial differential equations

Course Outcomes (COs)

Course Title & Code: Data Mining (CSE421A)

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

- CO-1. Describe the conceptual framework of classification and clustering
- CO-2. Explain the principles of supervised and unsupervised learning algorithms, training and test data
- CO-3. Apply machine learning techniques to solve problems of practical importance
- CO-4. Analyse the given data using classification and clustering algorithms
- CO-5. Synthesise and solve data mining problems of practical importance using theoretical analysis and software tools



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