Programme Matrix: Master of Science - Computer Science [2019 Batch]

Kristu Jayanti College
AUTONOMOUS Bengaluru
Reaccredited 'A' Grade by NAAC | Affiliated to Bengaluru North University

FACULTY OF SCIENCE

M.Sc. Computer Science

Programme Educational Objectives

PEO1: To provide conceptual and technical knowledge in the field of Computer Science.

PEO2: To nurture cutting edge technological skills to meet emerging global needs.

PEO3: To prepare graduates for careers in academia, industry and entrepreneurship.

PEO4: To develop socially responsible IT communities with professional and ethical values.

Programme Outcome

After the successful completion of two year M.Sc. Computer Science Programme, the graduate will be able to:

PO1: Demonstrate professional skills for global employability and lifelong learning.

Programme Specific Outcomes

After the successful completion of two year M.Sc. Computer Science Programme, the graduate will be able to:

PSO1: Apply computing skills, tools and techniques to address the national and global technological needs.

PSO2: Create software solutions in an interdisciplinary and multicultural global environment.

PSO3: Demonstrate professional ethics and the potential for independent research, industrial development and entrepreneurial ventures.

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I Semester

Course Type	Course Code	Course Title	Course Outcome
DSCC	**MCS204A11**	**Advanced Java Programming**	1. Understand the fundamental concepts of object-oriented programming with respect to Java including defining classes, methods and using class libraries. 2. Create java programs using Interface, packages, files, Thread, Exception and Swing. 3. Implement HTTP Server programming by creating servlets, deploying servlets, handling HTTP requests and responses, using GET and POST methods, cookies and session tracking. 4. Create web applications using JSP, XML.
DSCC	**MCS204A12**	**Data Structures and Algorithms**	1. Analyse linked list data structure. 2. Demonstrate stack and queue primitive operations. 3. Analysis of Non-recursive and recursive algorithms. 4. Explain sort and search algorithms using divide and conquer method. 5. Explain the backtracking and branch & bound methods
DSCC	**MCS204A13**	**Advanced Computer Architecture**	1. Demonstrate concepts of parallelism and pipelining in hardware/software. 2. Discuss memory organization and mapping techniques. 3. Illustrate the architectural features and functionality of an advanced processor. 4. Explain data flow in arithmetic algorithms. 5. Summarize the concepts and working of multiprocessor machines and inter-processor communication.
DSCC	**MCS204A14**	**Advanced Computer Networks**	1. Classify network technologies and protocols using OSI reference model and TCP/IP model. 2. Analyse 2G, 3G and 4G using IEEE LAN standards. 3. Apply error detection and correction methods during data transmission using forward error correction techniques. 4. Formulate the solution for routing and congestion problems using routing algorithms.
DSCC	**MCS204A15**	**Theory of Computation**	1. Design DFA, NFA, Regular Expressions, Alphabets, Symbols and Language for Formal Automata. 2. Solve automata problems using push down automata and Turing Machines. 3. Construct context free grammar for Chomsky and Griebach Normal Forms.
DSCL	**MCS2L2A11**	**Advanced Java Programming Practical**	1. Execute and debug programs using Java programming language. 2. Design and develop Java programs using overloading, inheritance, exceptions, files and Swing. 3. Create web applications using servlets, JSP and XML.

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DSCL	**MCS2L2A12**	**Data Structures and Algorithm Analysis Practical**	1. Develop sorting and searching algorithms for numeric data 2. Perform sort, search and traversal operations on tree and graph 3. Construct dynamic programming for solving knapsack and travelling salesman problems
SEC	**MSE4L2A11**	**Soft Skills**	1. Explain the metaphors used to develop their social work-life and personal skills for emotional well-being 2. Interpret the verbal and non-verbal communication techniques
NCCC	**MTC5S1A01**	**Technical Community Presentations**	1. Prepare and make a presentation on a technical topic beyond the regular syllabus

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II Semester

Course Type	Course Code	Course Title	Course Outcome
DSCC	**MCS204A21**	**Advanced Web Technologies**	1. Understand the basics of the Internet like WWW, DNS, web hosting, web publishing, search engines, and protocols like ftp, telnet and http. 2. Develop programs using HTML5 for web page creation and modification. 3. Explain the DOM structure model and its manipulation. 4. Summarize the role of web services and its related terminologies like UDDI, WSDL, SOAP and web xml. 5. Create web applications using jquery, AJAX, JSON, Angular JS and Bootstrap.
DSCC	**MCS204A22**	**Advanced Relational Database Management System**	1. Construct normalized databases and transactions satisfying the ACID properties and serializability for concurrent transactions. 2. Compare inter and intra query parallelism, inter and intra operation parallelism for query evaluation. 3. Design object based relational databases for database applications. 4. Sketch star and snow-flake schema for data warehouse. 5. Appraise the time series, mobile, object-oriented, spatial and, activity databases for advanced database applications.
DSCC	**MCS204A23**	**Advanced Software Engineering**	1. Analyse functional and non-functional requirements for project planning, scheduling, risk management and validation for project requirements. 2. Use object oriented design, real time software design, design with reusability and user interface design based on project requirements. 3. Evaluate the projects through software inspections / reviews, testing techniques with emphasis on clean-room software development. 4. Illustrate extreme programming and agile manifesto for developing projects.
DSCC	**MCS204A24**	**Advanced Operating Systems and Distributed Systems**	1. Illustrate characteristics and functionalities of distributed, real time, mobile and database operating systems. 2. Categorize load distribution, mutual exclusion algorithms and deadlock handling strategies in distributed operating systems. 3. Describe checkpoint algorithm for fault recovery and static, dynamic voting techniques for fault tolerance in distributed operating systems.
DSCC	**MCS204A25**	**Quantitative Techniques**	1. Analyse data statistically using measures of central tendency, dispersion, skewness, bi-variate correlation and simple linear regression techniques. 2. Use the classical approach of probability, addition, multiplication and Bayes theorem for computation of probability. 3. Illustrate tests of significance for single mean, single variance, difference of two means and analysis of variance.

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DSCL		**MCS2L2A21**	**Web Technologies Practical**	1. Execute programs using HTML5 and jquery. 2. Create web applications using AJAX, JSON, Angular JS and Bootstrap.
DSCP		**MCS2P2A21**	**Software Engineering Mini Project**	1. Develop projects for simple user requirements using waterfall, prototyping, spiral or agile development models. 2. Apply Software Engineering techniques, skills and modern computer Engineering tools for developing projects.
SEC		**MSE4L2A21**	**.NET Programming Practical**	1. Design graphical user interface using multiple forms, modules, menus and .NET controls 2. Manage connectivity between user interface and database
[Any ONE to be opted]	**NCCC**	**MIE5A1A01**	**Industry Exposure**	1. Understand the most recent and relevant technologies in practice by the IT industry
	NCCC	**MWK5A1A01**	**Workshop**	1. Understand the most recent and relevant software tools and technologies

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III Semester

Course Type			Course Code	Course Title	Course Outcome
DSCC			**MCS204A31**	**Artificial Intelligence and Expert Systems**	1. Demonstrate heuristic search techniques, best first search, mean end analysis, A*, AO*, min-max, and alpha-beta cutoff algorithms. 2. Illustrate list manipulations, functions, predicates, conditionals, input, output, logical variables, iteration, recursion in lisp and prolog programming concepts. 3. Demonstrate predicate logic, resolution, natural deduction, non monotonic reasoning, truth maintenance system, semantic nets, frames, scripts, conceptual dependency for knowledge representation techniques, architecture for neural networks and expert systems. 4. Recall robot architecture, Waltz algorithm, constraint satisfaction, trihedral and non-trihedral figures, pragmatic, syntactic and semantic analysis, RTN and ATN.
DSCC			**MCS204A32**	**Soft Computing**	1. Explain artificial neural network architecture, single layer and multilayer feed forward networks, recurrent networks, perception and convergence rule, parallel search using auto-associative and hetero-associative memory that affect neural networks. 2. Explain the properties of fuzzy sets, fuzzy and crisp relation and fuzzy to crisp conversion. 3. Evaluate fuzzy membership functions, interference, if-then rules, controller and fuzzification & defuzzification. 4. Construct optimized algorithms for a given maximizing or minimizing objective function using genetic algorithms. 5. Analyse backpropagation single and multilayer neural network, backpropagation algorithm, and the factors that affect neural networks. 6. Explain the properties of fuzzy sets, fuzzy and crisp relation and fuzzy to crisp conversion. 7. Evaluate fuzzy membership functions, interference, if-then rules, controller and fuzzification & defuzzification. 8. Construct optimized algorithms for a given maximizing or minimizing objective function using genetic algorithms.
DSCC			**MCS204A33**	**Data mining and Knowledge Management**	1. Sketch various data warehouse architectures. Explain data mining principles and preprocessing techniques. 2. Apply classification and clustering algorithms on numeric dataset. 3. Distinguish web mining algorithms Illustrate spatial and temporal data mining techniques and applications.
DSCL			**MCS2L2A31**	**Data Mining Practical using Rapid Miner / Weka**	1. Develop a classifier using K-nearest neighbour, decision tree, and neural network algorithm. 2. Construct a data mining system using unsupervised algorithms.
Elective Courses [Any	**Domain I**	**DSEC**	**MCSA04A31**	**Mobile Application Development**	1. Demonstrate the working principles of Android Operating System. 2. Explain techniques of using android software development. Tools. 3. Develop programs to deploy, debug and run on mobile devices.
		DSEP	**MCSAP2A31**	**Mini Project on Mobile Application Development**	1. Create GUI applications using Built in widgets and components. 2. Customize android applications related to layouts and rich interactive interface.
	Domain II	**DSEC**	**MCSB04A31**	**Advanced Multimedia and Applications**	1. Interpret the networks, operating system, database management system, architecture, developing tools and authoring tools needed for multimedia applications. 2. Explain the Virtual Reality concepts and processes of hand gloves, head mounted tracking system and displays, and VR chair.

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ONE Domain to be opted]					3. Apply lossy and lossless compression algorithms for text and image. 4. Describe technical characteristics and performance of multimedia devices.
		DSEP	**MCSBP2A31**	**Mini Project on Advanced Multimedia and Applications**	1. Develop multimedia projects using authoring tools. 2. Apply lossy and lossless compression algorithms for text and image.
	Domain III	**DSEC**	**MCSC04A31**	**Cloud Computing**	1. Analyse cloud computing architecture, characteristics, environment and the principles of virtualization. 2. Apply Aneka framework to set up cloud environments for cloud programming. 3. Design cloud application using Aneka threads and partition techniques domain decomposition and functional decomposition. 4. Discuss issues involved in energy efficient cloud computing and market models for cloud computing systems.
		DSEP	**MCSCP2A31**	**Mini Project on Cloud Computing**	1. Trace compute service, storage service and relational database service. 2. Develop cloud applications for analytic service and security service of AWS.
	Domain IV	**DSEC**	**MCSD04A31**	**Wireless Sensor Networks and IoT**	1. Explain the fundamentals, challenges, and performance techniques of wireless networks. 2. Analyse the physical layer and MAC layer technologies of IEEE 802.11and 802.15.4 standards. 3. Design a simple iot system made up of sensors, wireless network, data analytics and display/actuators. 4. Demonstrate the application specific architecture, protocols, middleware and information security of iot.
		DSEP	**MCSDP2A31**	**Mini Project on Wireless Sensor Networks and IoT**	1. Design an iot application environment using Arduino/raspberry pi IDE. 2. Build an iot system using sensors, display/actuator and communication networks.
SEC			**MSE4L2A31**	**Research Methodology**	1. Apply the research design process, scientific method, experimental design principles and sampling theory for research study 2. Infer statistical measures linear correlation, linear regression, t-test. F-test, paired t test and anova for research study 3. Prepare research paper using latex documentation system 4. Write research papers using report layouts and mechanics
[Any ONE to be opted]	**NCCC**		**MKT5S1A01**	**Knowledge Transfer Sessions**	1. Enhance their skills in a specific domain, fine-tuning their expertise.
	NCCC		**MSD5L1A01**	**Software Development**	1. Apply the knowledge of software engineering, programming, databases, and networking. Develop a quality real-time software solutions for in-house automated application requirements

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IV Semester

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DSCC		**MCS204A41**	**Compiler Design**	1. Describe translators and the design of a compiler including its phases, lexical analysis, syntax analysis, syntax directed definition, code optimization and code generation. 2. Analyse the role of lexical analyser or scanner, lexical errors, converting regular expressions to DFA, minimization of DFA, and design of a lexical analyser for a sample language. 3. Explain the need and role of the parser, context free grammars, recursive decent parser, predictive parser, shift reduce parser, LL(1) parser, LR(0) parser, construction of SLR parsing table, LALR parser and error handling and recovery. 4. Construct syntax trees, bottom up evaluation, attribute definitions, code optimization and code generation.
DSCC		**MCS204A42**	**Data Science and Analytics**	1. Describe Data science process. 2. Illustrate the big data platform and its analytic process. 3. Infer Hadoop and various tools in its Framework developing a map reduce application for word count problems.
DSCP		**MCS2P8A41**	**Major Project**	1. Develop solutions for framed problem statements recommended by the organization. 2. Implement hardware or software techniques for framed problems and test the modules of the developed project. 3. Write technical reports and deliver project presentations.
Elective Courses [Any ONE to be opted]	**DSEC**	**MCSA04A41**	**Network and Information Security**	1. Identify the most common network active and passive and treats. Compare the symmetric and asymmetric cryptographic algorithms. Implement the security standards Kerbros and X.509. 2. Apply Electronic mail security algorithms for data and mail transfer. 3. Appraise the types of attacks, virus, hackers and its implications.
	DSEC	**MCSB04A41**	**NoSQL DataBases**	1. Distinguish graph, key-value pairs, and document-oriented and column-oriented nosql databases. 2. Explain the architecture, define objects, load data, query data and performance of mongodb. 3. Create web applications using PHP and Python with nosql as the backend database.
	DSEC	**MCSC04A41**	**Advanced E-Commerce and M-Commerce**	1. Explain the anatomy, framework and consumer oriented applications. 2. Identify the importance of cybersecurity and cyber laws for e-commerce applications. 3. Use electronic payment systems like e-cheque, e-cash, credit and debit cards and smart cards. 4. Explain EDI, its applications in business, legal, security and privacy issues and its relation to electronic commerce. 5. Analyse the difference between mobile and electronic commerce, types of mobile commerce services, technologies and its framework.

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	DSEC	**MCSD04A41**	**Distributed and Parallel Computing**	1. Demonstrate concepts of parallelism in hardware/software. 2. Discuss distributed memory programming with message passing interface. 3. Describe shared memory programming with a multiprocessing interface. 4. Interpret the performance of distributed systems. 5. Develop software to solve computationally intensive problems.
SEC		**MSE4L2A42**	**Python Programming Practical**	1. Create a software application using the python programming language 2. Formulate database application using python 3. Create user defined functions in python 4. Debug a software application written in the python programming language 5. Test a software application written in the python programming language
[Any ONE to be opted]	**NCCC**	**MAE501A01**	**Aptitude Enhancement Sessions**	1. To hone the core competencies of the students and build confidence and professional attitude
	NCCC	**MRP5R1A01**	**Research Paper Presentation/ Publication**	1. Prepare reports and interpret the outputs of regression, classification and dimension reduction analysis