Deccan Education Society's

Fergusson College (Autonomous), Pune

Program Specific Outcomes (PSOs) and Course Outcomes (COs) 2019-20

Department of Computer Science

Programme: M.Sc. Computer Science

PSO No.	Program Specific Outcomes (PSOs) Upon completion of this programme the student will be able to
PSO1	**Academic competence**: (i) Understand a range of programming languages such as Python, R, C#, computing architecture, construction and design underlying in the field of computer science, and related disciplinary areas. (ii) Transfer the knowledge gained in the different computer science fields such as Soft computing, Information Security, Business intelligence to solve real world problems.
PSO2	**Personal and Professional Competence**: (i) Perform laboratory-orientated computer programs to demonstrate different programming language concepts. (ii) Design small executable software, useful mobile application by implementing analytical and critical thinking skills and deliver it on time in the form of report and PowerPoint presentation.
PSO3	**Research Competence: Research Competence:** (i) Analyse the computer software requirements and design a blueprint as well as executable application. (ii) Integrate the data collected during the software development process which enhances teamwork and leadership skills.
PSO4	**Entrepreneurial and Social competence:** (i) Apply skills learnt in the field of Artificial Intelligence, Data mining, Machine learning, Cloud Computing, Networking and Security, Software Quality Assurance in specific areas related to health, education, banking, defence etc. (ii) Develop skills required for social interaction.

Course Outcomes(COs)		
F.Y. M.Sc. Semester I		
Title of the Course and Course Code	**Data mining and Data Warehousing (CSC4101)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the mining architecture and the concept of algorithms.	1
CO2	Explain the components of data warehousing architecture and mining algorithms.	2
CO3	Implement various mining algorithms for the given data set by comparing the outcomes.	3
CO4	Differentiate the outcomes of various algorithms and analyze the prediction process on the given dataset.	4
CO5	Compare and contrast various algorithms with respect to efficiency and accuracy measures.	5
CO6	Combine the data warehouse architecture and data mining algorithms and execute the predictive and analytical modelling system.	6
Title of the Course and Course Code	**Analysis of Algorithm and Computing (CSC4102)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the algorithmic strategies for different problems and the way to analyze them.	1
CO2	Explain the importance and analysis of strategies using different examples.	2
CO3	Implement various algorithms and analyze it using different possible strategies.	3
CO4	Apply various algorithms to different type of problems.	4
CO5	Compare and contrast various algorithms with respect to their complexities.	5
CO6	Combine the knowledge of different strategy to write efficient algorithms for building an efficient software.	6

Title of the Course and Course Code	**Operating System Internals (CSC4103)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the Unix kernel architecture and concepts of files, users, groups, permissions.	1
CO2	Discuss concepts related to buffers, inode, data structures related to file and process subsystems.	2
CO3	Implement different file and process system calls using the C programming language.	3
CO4	Differentiate between different Unix memory management system calls.	4
CO5	Compare and contrast various signals available in the Unix operating system.	5
CO6	Combine file and process subsystems, memory and signal system calls to simulate the design of the Unix operating system.	6
Title of the Course and Course Code	**Python Programming (CSC4104)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the various components of Python programming language.	1
CO2	Grasp the idea of the individual constructs used in Python programming language.	2
CO3	Implement the various concepts learnt in Python programming language.	3
CO4	Differentiate between the other programming languages and Python.	4
CO5	Compare and contrast Python with the other programming languages.	5
CO6	Combine all concepts in Python and develop a working application.	6
Title of the Course and Course Code	**Computer Science Practical – I (CSC4105)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the various programming constructs of Python language.	1
CO2	Discuss the domain of the problem and analyze the problem to find the various entities of the domain.	2
CO3	Implement various programming constructs to code the analysis done for the problem domain.	3

CO4	Differentiate the analysis and the implementation phases appropriately.	4
CO5	Compare and contrast the use of various data structures to gain suitable knowledge about their implementation.	5
CO6	Combine all the programming constructs and develop a python program to give the desired functionality.	6
Title of the Course and Course Code	**Project I (CSC4106)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe a thorough and systematic understanding of project contents.	1
CO2	Illustrate knowledge of computing and mathematics appropriate to the discipline.	2
CO3	Implement project management knowledge, processes, tools and techniques in order to achieve success of the project.	3
CO4	Design, implement, and evaluate a computational system to meet desired needs within realistic constraints.	4
CO5	Integrate the identified modules using techniques and tools.	5
CO6	Evaluate the generated modules using evaluation techniques and tools.	6
	F.Y. M.Sc. Semester II	
Title of the Course and Course Code	**Programming in C# (CSC4201)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State the fundamentals of Dot Net architecture and C# Programming language.	1
CO2	Represent Object-Oriented principles applied in real life problems.	2
CO3	Demonstrate the usage of Reflection and Dynamic programming features.	3
CO4	Analyse the problem statement and choose appropriate features / technologies to provide solutions and communicate observations.	4
CO5	Identify different approaches for building service-oriented applications.	5
CO6	Evaluate appropriate data storage and data access strategy based on type, size of the data and need for data security.	6
Title of the Course and	**Full Stack I – Web UI and Responsive UI Framework (CSC4202)**	**Number of Credits : 04**

Course Code		
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various HTML tags for designing simple Web pages.	1
CO2	Illustrate and design interactive User Interface (UI) based web pages using functions of JavaScript.	2
CO3	Implement different methods of CSS styling and bootstrap for creation of effective web pages.	3
CO4	Analyze the responsiveness of a web page using jQuery.	4
CO5	Implement JavaScript and jQuery methods to test and validate the web UI.	5
CO6	Build real time, fast and dynamic web applications and web pages using AJAX.	6
Title of the Course and Course Code	**Business Intelligence and Analytics (CSC4203)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the Business architecture and the concepts of policies and procedures.	1
CO2	Explain the composition of analytics and business policies with the specified strategy.	2
CO3	Implement various procedural metrics in the given data set by comparing the outcomes.	3
CO4	Differentiate between various business models and analytic applications to analyze business strategies.	4
CO5	Compare and contrast various algorithms with respect to efficiency and accuracy measures related to business policies.	5
CO6	Combine the strategies and cost evaluation techniques for analysing and predicting the business process model.	6
Title of the Course and Course Code	**Robotics and Artificial Intelligence (CSC4204)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the knowledge of AI principles and techniques.	1
CO2	Discuss the basic principles of AI toward problem solving.	2
CO3	Implement various AI techniques by applying it to various problems.	3
CO4	Differentiate between various AI techniques with the help of real problems.	4

CO5	Compare and contrast various algorithms and their complexities.	5
CO6	Combine the knowledge of AI techniques, Knowledge representation strategies, reasoning mechanisms to build an intelligent system.	6
Title of the Course and Course Code	**Principles of Programming Languages (CSC4206)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define Programming Language Spectrum.	1
CO2	Compare various control flows and concurrency mechanisms.	2
CO3	Classify / observe various features of a programming language with syntactical description.	3
CO4	Analyse type disciplines in various programming languages.	4
CO5	Evaluate the various strategies of data abstraction and control abstraction and implement in problem solving.	5
CO6	Write small applications in non-imperative programming languages.	6
Title of the Course and Course Code	**Networking and information Security (CSC4207)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the lower layer architecture of computer networks.	1
CO2	Explain the concepts related to IP datagram and transport layer services.	2
CO3	Apply the routing protocols to find the best suited route for forwarding the datagram in the network.	3
CO4	Analyse the possible network attacks and propose the appropriate technique for securing the network system.	4
CO5	Compare and contrast different cryptography types and techniques.	5
CO6	Compile the knowledge of Unix socket system calls to build a client server communication application.	6
Title of the Course and Course Code	**Software Quality Assurance and Testing (CSC4208)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the software development life cycle from the perspective of Quality Assurance Engineer.	1

CO2	Illustrate various components of the project life cycle.	2
CO3	Implement various quality improvement techniques, assessment components and apply the suitable quality factors on the project.	3
CO4	Differentiate between the Quality Assurance and Testing.	4
CO5	Compare and contrast the different assessment components and various quality improvement techniques.	5
CO6	Combine all the techniques of quality control and improvement to assure quality of the project.	6
Title of the Course and Course Code	**Parallel Computing (CSC4210)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the importance and scope of parallel computing.	1
CO2	Understand various classification techniques and parallel programming paradigms.	2
CO3	Implement concepts of shared memory.	3
CO4	Differentiate the parallel programming with other traditional programming techniques.	4
CO5	Compare and Contrast parallel programming with shared memory to parallel programming with multi core.	5
CO6	Combine all the techniques together to develop the basic model with shared memory and check the performance and to understand the application of multicore programming.	6
Title of the Course and Course Code	**Computer Science Practical – II (CSC4211)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State fundamentals of Dot Net architecture, C# Programming language and User Interface (UI) designing.	1
CO2	Illustrate various Object-Oriented principles applied in real life problems. Demonstrate the use of CSS to design rich UI.	2
CO3	Design, develop professional console based and form based .NET applications. Design and implement various JavaScript methods to query a web page.	3
CO4	Differentiate various data storage and data access strategies.	4

	Apply various jQuery functions and methods to a Web application.	
CO5	Test and validate the usage of Reflection and Dynamic programming features. Evaluate different events and effects associated with jQuery.	5
CO6	Combine features and programming constructs to build service-oriented applications and to develop web applications.	6
Title of the Course and Course Code	**Project II (CSC4212)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe a through and systematic understanding of project contents.	1
CO2	Illustrate knowledge of computing and mathematics appropriate to the discipline.	2
CO3	Implement project management knowledge, processes, tools and techniques in order to achieve project success.	3
CO4	Design, implement, and evaluate a computational system to meet desired needs within realistic constraints.	4
CO5	Integrate the identified modules using techniques and tools.	5
CO6	Evaluate the generated modules using evaluation techniques and tools.	6
	S.Y. M.Sc. Semester III	
Title of the Course and Course Code	**Soft Computing (CSC5301)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the importance of different soft computing techniques.	1
CO2	Discuss the mathematical base of soft computing techniques and its application in real life problems.	2
CO3	Implement soft computing techniques like fuzzy logic and neural networks to solve the problems.	3
CO4	Differentiate between hard and soft computing techniques and illustrate different soft computing techniques.	4
CO5	Compare and contrast various algorithms under fuzzy logic and neural networks.	5
CO6	Combine the knowledge of all soft computing techniques to solve real life problems.	6
Title of the Course and	**Full Stack II: MEAN Stack (CSC5302)**	**Number of Credits : 04**

Course Code		
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various database schema designs of NoSQL database.	1
CO2	Illustrate different data modelling methods and different middleware.	2
CO3	Implement dynamic single page web applications using AngularJS.	3
CO4	Analyze the implementation of web applications and API's using express framework.	4
CO5	Test, validate streams and events for non-blocking I/O using Nodejs.	5
CO6	Build user interactive and efficient web applications using MEAN Stack.	6
Title of the Course and Course Code	**Software Project Management (CSC5303)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the concepts and various knowledge areas of project management.	1
CO2	Explain the knowledge of managing projects in the industry.	2
CO3	Implement various tools and techniques to manage the project deadlines and budget for cost and time management.	3
CO4	Differentiate between the process management and project management.	4
CO5	Compare and contrast various organizational structures, frames of the organization.	5
CO6	Combine the knowledge areas to identify, mitigate the risks and establish a proper communication channel within the team members.	6
Title of the Course and Course Code	**Cloud Computing (CSC5304)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various Cloud computing platforms and models.	1
CO2	Explain different cloud architectures and Operating systems related functions.	2
CO3	Implement various virtualization concepts and apply them to understand types of hypervisors used in cloud computing.	3
CO4	Classify different levels and challenges of security under	4

	cloud security architecture.	
CO5	Compare and contrast different types of service models under cloud platform.	5
CO6	Integrate various challenges and issues in cloud computing with respect to security and quality of services.	6
Title of the Course and Course Code	**Machine Learning (CSC5305)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the concept of intelligent systems with machine learning algorithms.	1
CO2	Explain the importance and efficiency of Machine learning algorithms with respect to complexity of the system.	2
CO3	Implement various functional methodologies of machine learning systems and represent its predictive approach.	3
CO4	Differentiate between various algorithms and analyze its efficiency by applying the Machine learning techniques.	4
CO5	Compare and contrast various algorithms with respect to efficiency and accuracy measures related to Machine learning outcomes in the given data set.	5
CO6	Combine the strategies and techniques for analysing and predicting the intelligent system.	6
Title of the Course and Course Code	**Modelling and Simulation (CSC5307)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different types of simulation techniques.	1
CO2	Illustrate the concepts of system modelling based on events and time.	2
CO3	Implement the concepts related to simulators and modelling formalisms.	3
CO4	Analyse the different probability techniques and models used for modelling and simulation.	4
CO5	Compare and contrast different analysis techniques used for models.	5
CO6	Integrate various techniques of verification and validation with respect to models.	6
Title of the Course and Course Code	**Cryptography and Cyber Forensics (CSC5308)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**

CO1	Describe different types of security in computing.	1
CO2	Explain the concepts of Info-Sys-Security, Cryptography and Cyber forensics.	2
CO3	Illustrate the concepts related to applied cryptography and its algorithms.	3
CO4	Analyze the requirements of computer security and choose the appropriate programming interface (API).	4
CO5	Compare different user authentication mechanisms.	5
CO6	Compile all the security techniques to build a secure digital environment.	6
Title of the Course and Course Code	**Digital Image Processing (CSC5309)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the fundamental concepts of a digital image processing system.	1
CO2	Explain different types of image transformations, need and their properties.	2
CO3	Evaluate the techniques for image enhancement and image restoration.	3
CO4	Analyse images in the frequency domain using various transforms.	4
CO5	Interpret image segmentation and representation techniques.	5
CO6	Integrate image segmentation and representation techniques.	6
Title of the Course and Course Code	**Data Science using R (CSC5310)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe concepts of Data Science and its specialised branches. State the use of R and R-Studio's interactive environment.	1
CO2	Illustrate fundamental concepts of R programming.	2
CO3	Apply the data manipulation and transformation techniques to prepare data for modelling.	3
CO4	Analyze the nature of data with help of statistical methods, different tools and visualization techniques. Infer the applicability of the algorithms for given data.	4
CO5	Evaluate the model performance by applying various algorithms and communicate the observations.	5
CO6	Write R scripts to build predictive models and to solve real world problems.	6
Title of the	**Natural Language Processing (CSC5312)**	**Number of Credits**

Course and Course Code		**: 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the basic concepts and algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics.	1
CO2	Understand the core concepts of Natural language processing and levels of language analysis.	2
CO3	Implement various natural language processing techniques by applying it to various problems.	3
CO4	Analyse different natural language processing techniques with the help of real problems.	4
CO5	Compare and contrast various natural language processing techniques and their complexities.	5
CO6	Combine the knowledge of natural language processing to design and implement applications based on natural language processing	6
Title of the Course and Course Code	**Project III (CSC5313)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe a thorough and systematic understanding of project contents.	1
CO2	Illustrate knowledge of computing and mathematics appropriate to the discipline.	2
CO3	Implement project management knowledge, processes, tools and techniques in order to achieve success of the project.	3
CO4	Integrate the identified modules using techniques and tools.	4
CO5	Evaluate the generated modules using evaluation techniques and tools.	5
CO6	Design a computational system to meet desired needs within realistic constraints.	6
SY. M.Sc. Semester IV		
Title of the Course and Course Code	**Industrial Training (CSC5401)**	**Number of Credits : 08**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the various skills, attitude and knowledge to understand the professionalism in the IT industry.	1
CO2	Discuss the working culture of the Industry in view to maintain quality standards.	2
CO3	Implement the confidence, presentation skills and	3

	logical thinking in developing the system.	
CO4	Differentiate between the academics and professional work culture in timely delivery of projects.	4
CO5	Compare and contrast the professional development of the programs and project.	5
CO6	Combine the techniques to enhance oneself as a thorough software professional.	6