

Savitribai Phule Pune University
Second Year of Artificial Intelligence and Data Science (2019 Course)
(With effect from Academic Year 2022-23)

Semester-III

Course Code	Course Name	Course Outcomes <i>(On completion of the course, learner will be able to-)</i>
210241	Discrete Mathematics	<p>C01: Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.</p> <p>C02: Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.</p> <p>C03: Design and analyse real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.</p> <p>C04: Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.</p> <p>C05: Calculate numbers of possible outcomes using permutations and combinations; to model and analyse computational processes using combinatorics.</p> <p>C06: Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.</p> <p>C07: Analyse the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures.</p>
210242	Fundamentals of Data Structures	<p>C01: Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyse the time and space complexity.</p> <p>C02: Discriminate the usage of various structures, Design/Program/Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.</p> <p>C03: Demonstrate use of sequential data structures- Array and Linked lists to store and process data.</p> <p>C04: Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application.</p> <p>C05: Compare and contrast different implementations of data structures (dynamic and static).</p> <p>C06: Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.</p>
210243	Object Oriented Programming	<p>C01: Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software.</p> <p>C02: Design object-oriented solutions for small systems involving multiple objects.</p> <p>C03: Use virtual and pure virtual function and complex programming situations.</p> <p>C04: Apply object-oriented software principles in problem solving.</p> <p>C05: Analyse the strengths of object-oriented programming.</p> <p>C06: Develop the application using object-oriented programming language (C++).</p>
210244	Computer Graphics	<p>C01: Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.</p> <p>C02: Apply mathematics to develop Computer programs for elementary graphic operations.</p> <p>C03: Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.</p> <p>C04: Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.</p> <p>C05: Understand the concepts of colour models, lighting, shading models and hidden surface elimination.</p> <p>C06: Create effective programs using concepts of curves, fractals, animation and gaming.</p>
217521	Operating Systems	<p>C01: Enlist functions of OS and types of system calls</p> <p>C02: Apply process scheduling algorithms to solve a given problem</p> <p>C03: Illustrate deadlock prevention, avoidance and recovery</p> <p>C04: Explain memory management technique</p> <p>C05: Illustrate I/O and file management policies</p> <p>C06: Describe Linux process management</p>

217522	Data Structures Laboratory	<p>C01: Use algorithms on various linear data structure using sequential organization to solve real life problems.</p> <p>C02: Analyse problems to apply suitable searching and sorting algorithm to various applications.</p> <p>C03: Analyse problems to use variants of linked list and solve various real-life problems.</p> <p>C04: Designing and implement data structures and algorithms for solving different kinds of problems.</p>
217523	OOP and Computer Graphics Laboratory	<p>C01: Understand and apply the concepts like inheritance, polymorphism, exception handling and generic structures for implementing reusable programming codes.</p> <p>C02: Analyse the concept of file and apply it while storing and retrieving the data from secondary storages.</p> <p>C03: Analyse and apply computer graphics algorithms for line-circle drawing, scan conversion and filling with the help of object-oriented programming concepts.</p> <p>C04: Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons.</p> <p>C05: Apply logic to implement, curves, fractals, animation and gaming programs.</p>
217524	Operating Systems Laboratory	<p>C01: Choose the best CPU scheduling algorithm for a given problem instance</p> <p>C02: Demonstrate interprocess communication</p> <p>C03: Apply deadlock avoidance algorithm</p> <p>C04: Compare performance of page replacement algorithms</p> <p>C05: Demonstrate the fundamental UNIX commands & system calls</p>
217525	Business Communication Skills	<p>C01: Express effectively through verbal/oral communication and improve listening skills</p> <p>C02: Write precise briefs or reports and technical documents.</p> <p>C03: Prepare for group discussion / meetings / interviews and presentations.</p> <p>C04: Explore goal/target setting, self-motivation and practicing creative thinking.</p> <p>C05: Operate effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership qualities.</p>
217526	Humanity and Social Science	<p>C01: Aware of the various issues concerning humans and society.</p> <p>C02: Aware about their responsibilities towards society.</p> <p>C03: Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.</p> <p>C04: Able to understand the nature of the individual and the relationship between self and the community.</p> <p>C05: Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures.</p>

Semester-IV

Course Code	Course Name	Course Outcomes (On completion of the course, learner will be able to-)
217528	Statistics	<p>C01: Identify the use of appropriate statistical terms to describe data</p> <p>C02: Use appropriate statistical methods to collect, organize, display, and analyse relevant data.</p> <p>C03: Use distribution functions for random variables</p> <p>C04: Distinguish between correlation coefficient and regression</p> <p>C05: Understand tests for hypothesis and its significance</p>
217529	Internet of Things	<p>C01: Have a thorough understanding of the structure, function and characteristics of computer systems and understand the structure of various number systems and its application in digital design.</p> <p>C02: Develop the skill set to build IoT systems and sensor interfacing.</p> <p>C03: Explain the concept of Internet of Things and identify the technologies that make up the internet of things</p> <p>C04: Analyse trade-offs in interconnected wireless embedded device networks. Select Appropriate Protocols for IoT Solutions</p> <p>C05: Design a simple IoT system comprising sensors by analysing the requirements of IoT Application</p> <p>C06: Identify the Application of IoT in automation of Commercial and Real-World examples</p>
210252	Data Structures and Algorithms	<p>C01: Identify and articulate the complexity goals and benefits of a good hashing scheme for real-world applications.</p> <p>C02: Apply non-linear data structures for solving problems of various domain.</p>

		<p>C03: Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.</p> <p>C04: Analyse the algorithmic solutions for resource requirements and optimization</p> <p>C05: Use efficient indexing methods and multiway search techniques to store and maintain data.</p> <p>C06: Use appropriate modern tools to understand and analyse the functionalities confined to the secondary storage.</p>
210253	Software Engineering	<p>C01: Analyse software requirements and formulate design solution for a software.</p> <p>C02: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.</p> <p>C03: Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.</p> <p>C04: Model and design User interface and component-level.</p> <p>C05: Identify and handle risk management and software configuration management.</p> <p>C06: Utilize knowledge of software testing approaches, approaches to verification and validation.</p> <p>C07: Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.</p>
217530	Management Information System	<p>C01 : Explain the concepts of Management Information System and Business intelligence for MIS.</p> <p>C02 : Illustrate the need of information systems in global business and ethical issues.</p> <p>C03 : List the IT infrastructure components and explain security in the Information System.</p> <p>C04 : Demonstrate the importance of project management and extend its use in the international information system.</p> <p>C05 : Illustrate the concepts of decision support systems for business applications.</p> <p>C06 : Relate artificial intelligence and data science for Management Information System.</p>
217531	Internet of Things Laboratory	<p>C01: Understand IOT Application Development using Raspberry Pi/ Beagle board/ Arduino board</p> <p>C02: Develop and modify the code for various sensor-based applications using wireless sensor modules and working with a variety of modules like environmental modules.</p> <p>C03: Make use of Cloud platform to upload and analyse any sensor data</p>
217532	Data Structures and Algorithms	<p>C01: Understand the ADT/libraries, hash tables and dictionary to design algorithms for a specific problem.</p> <p>C02: Choose most appropriate data structures and apply algorithms for graphical solutions of the problems.</p> <p>C03: Apply and analyse non-linear data structures to solve real world complex problems.</p> <p>C04: Apply and analyse algorithm design techniques for indexing, sorting, multi-way searching, file organization and compression.</p> <p>C05: Analyse the efficiency of most appropriate data structure for creating efficient solutions for engineering design situations.</p>
217533	Project Based Learning II	<p>C01: Identify the real-life problem from societal need point of view</p> <p>C02: Choose and compare alternative approaches to select most feasible one</p> <p>C03: Analyse and synthesize the identified problem from technological perspective</p> <p>C04: Design the reliable and scalable solution to meet challenges</p> <p>C05: Evaluate the solution based on the criteria specified</p> <p>C06: Inculcate long life learning attitude towards the societal problems</p>