

**Savitribai Phule Pune University**  
**Third Year of Artificial Intelligence and Machine Learning (2020 Course)**  
**(With effect from Academic Year 2022-23)**

**Semester-V**

Course Code	Course Name	Course Outcomes (On completion of the course, learner will be able to-)
318541	Design and Analysis of Algorithm	<b>C01:</b> Calculate computational complexity using asymptotic notations for various algorithms. <b>C02:</b> Demonstrate a familiarity with divide-conquer and greedy algorithms. <b>C03:</b> Describe and analyze the dynamic-programming paradigm for optimal solution. <b>C04:</b> Solve problems using backtracking approach. <b>C05:</b> Compare different methods of Branch and Bound strategy. <b>C06:</b> Classify P, NP, and NP Complete, NP hard problem.
318542	IoT with Artificial Intelligence	<b>C01:</b> Understand internet of Things and its hardware and software components. <b>C02:</b> Describe intelligent IOT systems. <b>C03:</b> Analyze Protocol standardization for IOT. <b>C04:</b> Perform an analysis of IOT security issues using AI technology. <b>C05:</b> Identify the role of cloud computing in IOT. <b>C06:</b> Develop IoT infrastructure for popular applications.
318543	Web Technology	<b>C01:</b> Analyze behavior of web pages using web technologies <b>C02:</b> Develop Static and Dynamic websites using technologies like HTML, CSS, Bootstrap <b>C03:</b> Demonstrate the use of web scripting languages <b>C04:</b> Develop web application with Front End & Back End Technologies <b>C05:</b> Develop mobile website using JQuery Mobile <b>C06:</b> Deploy web application on cloud using AWS
318544	Management and Entrepreneurship for IT Industry	<b>C01:</b> Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship <b>C02:</b> Utilize the resources available effectively through ERP <b>C03:</b> Make use of IPRs and institutional support in entrepreneurship <b>C04:</b> Understand the role of entrepreneurs in economic development, barriers, Identification of business opportunities, feasibility studies. <b>C05:</b> Understand the contents of project report, ERP and project. <b>C06:</b> Understand IPRs and institutional support in entrepreneurship, Case Study of Entrepreneurs. <b>C07:</b> Learners will explore entrepreneurial skills and management function of a company with special reference to SME sector.
318545 (C)	Information Security	<b>C01:</b> Model the cyber security threats and apply formal procedures to defend the attacks. <b>C02:</b> Apply appropriate cryptographic techniques by learning symmetric key cryptography. <b>C03:</b> Apply appropriate cryptographic techniques by learning asymmetric key cryptography. <b>C04:</b> Design and analyze web security solutions by deploying various cryptographic techniques along with data integrity algorithms. <b>C05:</b> Identify and Evaluate Information Security threats and vulnerabilities in Information systems and apply security measures to real time scenarios. <b>C06:</b> Demonstrate the use of standards and cyber laws to enhance Information Security in the development process and infrastructure protection.
318546	Software Laboratory I (IoT with Artificial Intelligence)	<b>C01:</b> Understand IOT Application Development using Raspberry Pi/ Beagle board/ Arduino board <b>C02:</b> Develop and modify the code for various sensor-based applications using wireless sensor modules and working with a variety of modules like environmental modules. <b>C03:</b> Make use of Cloud platform to upload and analyze any sensor data
318547	WT Laboratory	<b>C01:</b> Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrap and AJAX. <b>C02:</b> Create Version Control Environment. <b>C03:</b> Develop an application using front end and backend technologies. <b>C04:</b> Develop mobile website using JQuery Mobile. <b>C05:</b> Deploy web application on cloud using AWS.

318548 (C)	Information Security Laboratory	<b>C01:</b> Use tools and techniques in the area of Information Security. <b>C02:</b> Use cryptographic techniques for problem solving. <b>C03:</b> Design and develop security solutions. <b>C04:</b> Protect and defend information systems.
318549	Seminar / Mini Project	<b>C01:</b> Analyze a latest topic of professional interest. <b>C02:</b> Identify an engineering problem, analyze it and propose a work plan to solve it. <b>C03:</b> Communicate with professional technical presentation skills. <b>C04:</b> Design solution to real life problems and analyze its concerns through shared cognition. <b>C05:</b> Tackle technical challenges for solving real world problems with team efforts.
318550	Environmental Studies	<b>C01:</b> The understand nature of environment studies & Importance. <b>C02:</b> Design the Structure and function of ecosystem <b>C03:</b> The use of Natural Resources in real time environment <b>C04:</b> Undesirable changes occurring in the physical, chemical, and biological composition of natural environment consisting of air, water, and soil. <b>C05:</b> The commitment of an organization or government to the laws, regulations, and other policy mechanisms concerning environmental issues <b>C06:</b> Humans impact their environment through their habits, actions, and choices.
318551 (D)	Mandatory Audit Course 5	On completion of the course, the learner will acquire additional knowledge of computer and programming skills.

### Semester-VI

Course Code	Course Name	Course Outcomes (On completion of the course, learner will be able to-)
318552	Machine Intelligence for Data Science	<b>C01:</b> Apply data preprocessing methods on open access data and generate quality data for analysis <b>C02:</b> Apply appropriate statistical measures for machine learning applications. <b>C03:</b> Apply regression techniques to machine learning problems. <b>C04:</b> Apply and build classification models using SVM. <b>C05:</b> Apply decision tree and ensembles methods to solve real time applications. <b>C06:</b> Apply and build clustering models using clustering methods and its corresponding algorithms.
318553	Data Mining & Warehousing	<b>C01:</b> Ability to understand the various kinds of tools. <b>C02:</b> Apply frequent pattern and association rule mining techniques for data analysis <b>C03:</b> Apply appropriate classification and clustering techniques for data analysis <b>C04:</b> Apply frequent pattern and association rule mining techniques for data analysis & Study Warehouse with design and Components. <b>C05:</b> Apply suitable pre-processing and visualization techniques for data analysis <b>C06:</b> Design a Data warehouse system and perform business analysis with OLAP tools.
318554	Artificial Neural Networks	<b>C01:</b> Recognize Learning Tasks and Learning Problems <b>C02:</b> Differentiate between Learning in humane and Learning in Artificial Neural Networks. <b>C03:</b> Understand Predictive learning with Feed Forward Neural Networks and Limitations <b>C04:</b> Analyze Neural network architectures for solving Optimization Problems <b>C05:</b> Investigate neural network architecture for descriptive tasks <b>C06:</b> Understand learning type in Deep Neural Networks and their Applications
318555 (C)	AI for Cyber Security	<b>C01:</b> Understand the fundamental of AI and Cyber Security. <b>C02:</b> Analyze the cyber security threats and malware threats with AI. <b>C03:</b> Analyze and apply network anomaly detection techniques to machine learning problems. <b>C04:</b> Apply various algorithms to protect the sensitive information. <b>C05:</b> Understand and apply tools for the various GANs attacks. <b>C06:</b> Understand to evaluate algorithms.
318556	Software Laboratory II	<b>C01:</b> Demonstrate proficiency with statistical analysis of data. <b>C02:</b> Use statistical analyses with professional statistical software. <b>C03:</b> Apply data science concepts and methods to solve problems.
318557	Software Laboratory III	<b>C01:</b> Ability to understand the various kinds of tools. <b>C02:</b> Demonstrate the classification, clustering and etc. in large data sets. <b>C03:</b> Ability to add mining algorithms as a component to the exiting tools. <b>C04:</b> Demonstrate proficiency with statistical analysis of data. <b>C05:</b> Use statistical analyses with professional statistical software. <b>C06:</b> Apply data science concepts and methods to solve problems.

318558	Internship / Skill Development / Global Certification Program	<b>C01:</b> To demonstrate professional competence through industry internship. <b>C02:</b> To apply knowledge gained through internships to complete academic activities in a professional manner. <b>C03:</b> To choose appropriate technology and tools to solve given problem. <b>C04:</b> To demonstrate abilities of a responsible professional and use ethical practices in day to day life. <b>C05:</b> Creating network and social circle, and developing relationships with industry people. <b>C06:</b> To analyze various career opportunities and decide carrier goals.
318559	Seminar & Technical Communication	<b>C01:</b> Analyze a latest topic of professional interest. <b>C02:</b> Enhance technical writing skills. <b>C03:</b> Identify an engineering problem, analyze it and propose a work plan to solve it. <b>C04:</b> Communicate with professional technical presentation skills.
318560 (D)	Mandatory Audit Course 6	On completion of the course, learner will acquire additional knowledge and skill