Society for Computer Technology and Research's

# Pune Institute of Computer Technology

## Department of Information Technology

# COURSE OUTCOMES

## Third Year (2019 Pattern)

| C19301: Theory of Computation | |
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| Students will be able to | |
| C19301.1 | construct finite automata and its variants for regular languages |
| C19301.2 | write regular expressions for the regular languages and finite automata |
| C19301.3 | classify types of grammar, design and simplify Context Free Grammar |
| C19301.4 | construct Pushdown Automata and Post Machines for the formal languages |
| C19301.5 | design and analyze Turing Machine for formal language |
| C19301.6 | understand decidable and undecidable problems, analyze complexity classes |
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| **C19302: Operating System** | |
| Students will be able to | |
| C19302.1 | explain the evolution, briefly describe key design areas in the development of modern operating systems (OS) using modern UNIX systems as examples |
| C19302.2 | explain the differences between process and thread management and assess the performance of different scheduling policies used in traditional UNIX systems. |
| C19302.3 | discuss concurrency mechanisms, explain how deadlock is dealt with, and illustrate synchronization issues and deadlock issues through analyzing classical IPC problems |
| C19302.4 | discuss and apply the concept and techniques of memory management and virtual memory management to solve related problems. |
| C19302.5 | discuss OS support for I/O, describe I/O mechanisms, and determine average seek times using disk scheduling algorithms. |
| C19302.6 | describe the different components of operating systems, such as assembler, linker, and loader functions, as well as the phases of a compiler and a macro processor. |
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| **C19303 : Machine Learning** | |
| Students will be able to | |
| C19303.1 | recognize basic concepts of machine learning, it's paradigms |
| C19303.2 | compare different types of classification models and their relevant application |
| C19303.3 | differentiate various regression techniques and evaluate their performance |
| C19303.4 | illustrate the tree-based and probabilistic machine learning algorithms |
| C19303.5 | identify different unsupervised learning algorithms for the related real-world problems |
| C19303.6 | apply fundamental concepts of ANN |

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| **C19304 : Human Computer Interaction** | |
| Students will be able to | |
| C19304.1 | explain the importance of Human Computer Interaction study and principles of User Centered Design approach. |
| C19304.2 | develop understanding of human factors in HCI design |
| C19304.3 | describe models, styles, paradigms of Interaction and Interpret User Experience. |
| C19304.4 | design effective user Interfaces by using structured and organized UCD process. |
| C19304.5 | evaluate the Usability of User Interface Design by applying Design Rules, guidelines, and evaluation techniques. |
| C19304.6 | apply cognitive models for predicting human-computer-interactions. |
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| **C19305A : Elective-I Design and Analysis of Algorithm** | |
| Students will be able to | |
| C19305A.1 | use fundamental knowledge of proof techniques and recurrence relation to analyze the performance of algorithm to evaluate space and time complexity by using asymptotic notations |
| C19305A.2 | illustrate divide & Conquer as well as Greedy approach for a given optimization problem and analyze time complexity in term of Worst, Best and average case with different input values |
| C19305A.3 | to recognize the nature of given optimization problem to incorporate dynamic programming approach and compare with other algorithmic strategy such as greedy approach. |
| C19305A.4 | illustrate backtracking strategy to find feasible solution for optimization problem |
| C19305A.5 | solve the classical problems by applying appropriate bounding functions using Branch and Bound strategy |
| C19305A.6 | classify computational complexity class P, NP of a given problem |
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| **C19305B : Elective-I Advanced Database Management System** | |
| Students will be able to | |
| C19305B.1 | understand relational and object-oriented databases. |
| C19305B.2 | apply Parallel query evaluation methods for parallel & distributed database architectures. |
| C19305B.3 | implement Database system(student database/Employee database etc) on Mongo DB. |
| C19305B.4 | implement Star and Snow flake Schema for a given data warehouse |
| C19305B.5 | explain predictive and Descriptive algorithms for data mining. |
| C19305B.6 | learn emerging and enhanced data models for advanced applications. |
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| **C19306 : Operating Systems Laboratory** | |
| Students will be able to | |
| C19306.1 | apply the basics of Linux commands. |

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| C19306.2 | build shell scripts for various applications. |
| C19306.3 | Implement basic building blocks like processes, threads under the Linux. |
| C19306.4 | develop various system programs for the functioning of OS concepts in user space like concurrency control, CPU Scheduling, Memory Management and Disk Scheduling in Linux. |
| C19306.5 | develop system programs for Inter Process Communication in Linux |
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| **C19307 : Human Computer Interaction Laboratory** | |
| Students will be able to | |
| C19307.1 | differentiate between good design and bad design. |
| C19307.2 | analyze creative design in the surrounding. |
| C19307.3 | assess design based on feedback and constraint. |
| C19207.4 | design paper-based prototypes and use wire frame. |
| C19307.5 | implement user-interface design using web technology. |
| C19307.6 | evaluate user-interface design using HCI evaluation techniques. |
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| **C19308A : Laboratory Practice-I [ Machine Learning + Design and Analysis of Algorithm]** | |
| Students will be able to | |
| C19308A.1 | apply Data Preprocessing techniques on data set and evaluate their performance by using confusion matrix using suitable Python packages |
| C19308A.2 | implement the Classification and Regression algorithms and evaluate their performance using suitable Python packages |
| C19308A.3 | implement the Clustering algorithm and evaluate their performance using suitable Python packages |
| C19308A.4 | demonstrate Bellmon ford using Dynamic progrmming and Knapsack problem using greedy as well as dynamic programming to compare for optimality |
| C19308A.5 | apply Backtracking strategies to solve N-Queen problem |
| C19308A.6 | illustrate travelling salesman problem using LC Branch and Bound |
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| **C19308B: Laboratory Practice-I [ Machine Learning + Advanced Database and Management System]** | |
| Students will be able to | |
| C19308B.1 | apply Data Preprocessing techniques on data set and evaluate their performance by using confusion matrix using suitable Python packages . |
| C19308B.2 | implement the Classification and Regression algorithms and evaluate their performance using suitable Python package |
| C19308B.3 | implement the Clustering algorithm and evaluate their performance using suitable Python packages |
| C19308B.4 | implement NoSQL MongoDB commands and Populate/query a database using MongoDB commands. |
| C19308B.5 | design a data warehouse schema of any one real-time data warehouse such as Banking |

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| C19308B.6 | develop small application with NoSQL Database as a back-end. |
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| **C19309 : Seminar** | |
| Students will be able to | |
| C19309.1 | gather, interpret, and summarize a technical literature of selected/given area in a focussed manner and will be able to identify and define future work/ problem statements based on real world applications in the field of Information Technology. |
| C19309.2 | analyze, compare, and distinguish the techniques used to accomplish the selected task. |
| C19309.3 | prepare and present the content/work by using modern tools and techniques in an effective manner. |
| C19309.4 | exhibit interpersonal skills and ethical practices. |
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| **C19310A : Audit Course 5 - Banking and Insurance** | |
| Students will be able to | |
| C19310A.1 | differentiate between types of banks and their working. |
| C19310A.2 | carry out banking transactions on their own. |
| C19310A.3 | decide which insurance policy they should buy. |
| C19310A.4 | handle investing in annuities and claim settlements. |
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| **C19310B : Audit Course 5 - Startup Ecosystems** | |
| Students will be able to | |
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| C19310B.1 | able to identify Startup opportunities |
| C19310B.2 | explain legal and other requirements for new ventures |
| C19310B.3 | analyze financial Issues of startups |
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| **C19310C : Audit Course 5 - Foreign Language–(Japanese Language- III )** | |
| Students will be able to | |
| C19310C.1 | ability of basic communication. |
| C19310C.2 | Knowledge of Japanese script (reading, writing and listening skills). |
| C19310C.3 | Knowledge about Japanese culture, life style, manners and etiquettes. |
| C19310C.4 | develop interest to pursue a professional Japanese Language course. |

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| **C19311 : Computer Networks & Security** | |
| Students will be able to | |
| C19311.1 | describe, compare and analyze the responsibilities, services offered and protocol used at the application layer of the network. |
| C19311.2 | discuss the working principle of wireless networks and distinguish among different wireless standards. |
| C19311.3 | explain working principle of adhoc network's MAC layer & sensor network , classify ad-hoc routing protocol & sensor network routing protocol |
| C19311.4 | define principle concepts of network security and discuss & differentiate network security threats, security services, and countermeasures. |
| C19311.5 | apply basic cryptographic techniques in application development. |
| C19311..6 | comprehend basics of cyber security, vulnerabilities & describe typical threats to modern digital systems. |
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| **C19312 : Data Science and Big Data Analytics** | |
| Students will be able to | |
| C19312.1 | define Data science and Big Data through sample data explosion examples and classify Big Data processing architectures such as Data Warehouse, Re-Engineering the Data Warehouse, shared everything and shared nothing architecture. |
| C19312.2 | illustrate and apply concepts of probability, Statistical methods and data streaming models in Big data analytics. |
| C19312.3 | distinguish Big Data Ecosystem and Technologies like GFS and Hadoop by discussing HDFS, Map Reduce, NoSQL, Textual ETL and Hadoop configuration. |
| C19312.4 | explain Big Data Analytics Architecture and Life Cycle and summarize Data Ingestion from different sources, Data cleaning, Handling missing values, data imputation, Data transformation, Data Standardization, handling categorical data, statistical and graphical analysis methods, Hive Data Analytics. |
| C19312.5 | identify need, challenges, types, techniques, open source and Propriety tools such as Tableau, Candela, D3.js, Google Chart API for Big Data visualization and analyze the Case Study of a business problem of Zomato using visualization. |
| C19312.6 | to illustrate Big data Applications such as Social media analytics, Text mining, Mobile analytics and identify Organizational impact. |
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| **C19313 : Web Application Development** | |

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| Students will be able to | |
| C19313.1 | explain fundamentals and importance of web development technologies like HTML, CSS and Bootstrap and write well-formed HTML and CSS web page. |
| C19313.2 | create dynamic interactive webpage using JavaScript, AJAX framework and JQuery. |
| C19313.3 | apply the concepts of front-end technologies for dynamic web applications. |
| C19313.4 | discuss the principles behind using back-end technologies like NodeJS, ExpressJS and MongoDB. |
| C19313.5 | use JQuery mobile framework for construction of mobile webpage. |
| C19313.6 | setup/Manage web application on cloud using AWS. |
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| **C19314A : Elective-II Artificial Intelligence** | |
| Students will be able to | |
| C19314A.1 | elaborate the fundamental concepts of AI and delineate Statistical Analysis and Search Strategies with respect to it. |
| C19314A.2 | describe searching strategies and choose appropriate strategy for AI based problem solving. |
| C19314A.3 | explain knowledge representation methods and demonstrate knowledge reasoning with respect to it for solving real world problems. |
| C19314A.4 | recognize the basic concepts of NLP and apply the suitable technique of NLP for developing AI based application. |
| C19314A.5 | identify the suitable concept from Game Theory domain review and employ it to design AI application. |
| C19314A.6 | apply the AI concepts for application development in the domain of Robotics, Neural Networks, deep learning, IOT and Computer Vision. |
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| **C19314C : Elective-II Cloud Computing** | |
| C19314C.1 | explain basic concepts, key technologies, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models, Federated Cloud/Intercloud, Types of Clouds. |
| C19314C.2 | identify the need of cloud enabling technologies such as broadband networks and internet architecture, data center technology, virtualization technology and illustrate different implementation levels of virtualization, virtualization structures/tools and mechanisms, types of hypervisors, virtualization of CPU, Memory, and I/O Devices. |

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| C19314C.3 | describe various common standards such as the open cloud consortium, open virtualization format along with standards for application development such as Browsers (Ajax), Data (XML, JSON), and classify cloud platforms like AWS, GAE and Microsoft Azure. |
| C19314C.4 | describe cloud file systems such as GFS, HDFS, BigTable, HBase and cloud data storage such as Datastore and Simple DB Gautam Shrauf, Cloud Storage Providers and Securing the Cloud, General Security advantages, Introducing Business Continuity and Disaster Recovery and understanding the threats. |
| C19314C.5 | interpret cloud trends in Supporting Ubiquitous Computing, distributed systems, IoT such as RFID, Sensor Networks and ZigBee Technology, GPSand applications of IoT such as Smart Buildings and Smart Power Grid, Retailing and Supply-Chain Management, Cyber-Physical System |
| C19314C.6 | identify future trends of cloud computing with reference to operating systems, location aware applications, intelligent fabrics and paint and various types of cloud computing techniques such as Home-Based Cloud Computing, Mobile Cloud, Autonomic Cloud Engine, and the concept of Docker. |
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| **C19315 : Internship** | |
| C19315.1 | demonstrate professional competence through industry internship. |
| C19315.2 | apply knowledge gained through internships to complete academic activities in a professional manner. |
| C19315.3 | Select appropriate technology, tools and to apply it solve given problem. |
| C19315.4 | demonstrate abilities of a responsible professional and use ethical practices in day to day life. |
| C19315.5 | Creating network and social circle, and developing relationships with industry people. |
| C19315.6 | analyze various career opportunities and decide carrier goals. |
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| **C19316 : Computer Networks & Security-Laboratory** | |
| C19316.1 | design and configure small size network and apply router commands for configuration of routing protocols. |
| C19316.2 | configure various client/server environments to use transport & application layer protocols. |
| C19316.3 | apply shared & public cryptosystem techniques for implementation of privacy, authentication. |
| C19316.4 | analyze network traffic using intrusion detection tool |

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| **C19317 : Data Science and Big Data Analytics Laboratory** | |
| C19317.1 | design and execute distributed application using MapReduce framework by installing Hadoop and perform various operations such as create, drop, alter load data, insert values and create index on database tables using HiveQL. |
| C19317.2 | demonstrate operations such as subset creation, merge, sort, transpose, shape and reshape data and perform Data cleaning, Data integration, Data transformation, Error correction and Data model building on various datasets using Python. |
| C19317.3 | showcase data mining in Hive and analyze data using the Map Reduce in PyHadoop by Integrating Python and Hadoop. |
| C19317.4 | examine the effect of data visualization using Python libraries such as Matplotlib, seaborn and Tableau tool by plotting the graphs on various datasets. |
| C19317.5 | design review scrapper for any ecommerce website to fetch real time comments and other parameters and develop mini-project in a group using different predictive models techniques to solve any real life problem using Python. |
| **C19318 : Laboratory Practice-II[Web Application Development Lab]** | |
| C19318.1 | Students will be able to design and build Static and Dynamic responsive websites using technologies HTML, CSS, Bootstrap and AJAX. |
| C19318.2 | Students will be able to create repositories on GitHub, Docker container environment and Angular application. |
| C19318.3 | Students will be able to design and Develop applications using front end and backend technologies like Node.JS, ExpressJS and MongoDB. |
| C19318.4 | Students will be able to construct mobile website using JQuery Mobile. |
| C19318.5 | Students will be able to demonstrate deployment of web applications on AWS VPC or AWS Elastic Beanstalk. |
| C19318.6 | Students will be able to implement and Demonstrate mini project on a web application using full stack development technologies. |
| **C19318 : Laboratory Practice-II[Artificial Intelligence Lab]** | |
| C19318.1 | Apply suitable Uninformed search technique. |
| C19318.2 | Demonstrate Heuristic Search Technique and apply it to solve n-queens problem |

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| C19318.3 | Apply appropriate knowledge representation and reasoning technique to solve Water jug problem / Towers of Hanoi problem |
| C19318.4 | Use NLP tool for implementation of the Information Retrieval System |
| C19318.5 | Employ ethics and practices of game theory for the Tic-Tac-Toe game. |
| C19318.6 | Design and develop an AI based system to solve real world problem by working in a team |
| **C19318 : Laboratory Practice-II (Cloud Computing Lab)** | |
| C19318.1 | create hello world and simple web applications using python or java and launch it using Google App Engine |
| C19318.2 | simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim |
| C19318.3 | Identify a procedure to transfer the files from one virtual machine to another virtual machine and launch virtual machine using trystack (Online Openstack Demo Version) |
| C19318.4 | design and deploy a web application in a PaaS environment. |
| C19318.5 | design and develop custom applications using Salesforce Cloud. |
| C19318.6 | design an application to retrieve, verify, and store user credentials using Firebase Authentication, the Google App Engine standard environment, and Google Cloud Data store. |
| **C19319B : Audit Course 6 - Leadership and Personality Development** | |
| C19319B.1 | practice responsible decision-making and personal accountability. |
| C19319B.2 | demonstrate an understanding of group dynamics and effective teamwork. |
| C19319B.3 | develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others. |
| C19319B.4 | develop multi-dimensional personality. |