SNDT Women’s University Usha Mittal Institute of Technology

**Name of Program:Bachelor of Technology**

**Name of Course:Data Science(DS)**

|  |
| --- |
| **Program Outcomes** |
| **PO1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.**PO2.Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.**PO3.Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.**PO4.Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.**PO5.Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.**PO6.The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and theconsequent responsibilities relevant to the professional engineering practice.**PO7.Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.**PO8.Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.**PO9.Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**PO10.Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**PO11.Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**PO12. Self-Initiated Education:** Recognize the need for personal development and focus on enhancing the ability to engage in independent and life-long learning in the broadest context of technological change. |
| **ProgramSpecificOutcomes** |

|  |
| --- |
| At the end of the program,the student:**PSO1**. Should be able to understand the concepts and demonstrate knowledge in the field of Data structures and algorithms, Neural Networks, Architecture of Data Processing, Data Visualization, Deep Learning, Data Science and Data analytics.**PSO2**. Should be able to design projects using modern design tools to associate the learning from the courses to arrive at solutions to real world problems.**PSO3.** Will be able to use research-based knowledge and research methods for investigation and analysis of Complex problem.**PSO4**. Should possess the skills to communicate in both verbal and written forms, the work already done and the future with necessary road maps, demonstrating the practice of professional ethics and the concerns for societal and environmental wellbeing. |
| **Course Outcomes** |
| **Semester-I** |
| **Course Code** | **Course Name** | **Course Outcomes** |
| BasicScien cecourse (BSC101) | AppliedScience (Physics andChemistry) | 1. Learnaboutelectric andmagneticfields.
2. Learnaboutscalerandvectorfields.
3. Maxwell's equations that define basic laws of electromagnetism. Propagation of electromagnetic waves through free space (Vacuum or Non conducting media).
4. Analyze atomic and molecular structure in terms of wavefunctions, charge densities and energy level diagrams.
5. Obtain quantitative information about energy levels through molecular spectroscopic methods such as electronic, vibrational,rotational,andnuclearmagneticresonance(NMR) spectroscopy.
6. Rationalizeperiodicpropertiessuchasionizationpotential, electronegativity, oxidation states and electronegativity
 |
| Basic Science course (BSC103) | Mathematics–I | Thestudentswill learn:1. To apply differential calculus to notions of curvature and toimproperintegrals.Apartfromsomeotherapplicationstheywill have a basic understanding of Beta and Gamma functions.
2. ThefalloutsofRolle’sTheoremthatisfundamentalto application of analysis to Engineering problems.
3. ThetoolofpowerseriesandFourierseriesforlearning advanced Engineering Mathematics.
4. Todealwithfunctionsofseveralvariablesthatare essential in most branches of Engineering.
5. Theessentialtoolofmatricesandlinearalgebraina comprehensive manner.
 |
| Engineeri-ng ScienceCourses(ESC101) | Basic Electrical Engineering | 1. To understand and analyze basic electric and magneticcircuits
2. To study the working principles of electrical machines
3. To introduce the components of low voltage electrical installations.
 |

|  |  |  |
| --- | --- | --- |
| Engineerin g Science Courses (ESC102) | Engineering Graphics&Design | 1. To prepare you to design a system, component, or process tomeetdesiredneedswithinrealisticconstraintssuchaseconomic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. Toprepareyou tocommunicate effectively
3. Toprepareyoutousethetechniques,skills,andmodern engineering tools necessary for engineering practice
 |
|  | AppliedScience Lab | The physics and chemistry laboratory course will consist of experiments illustrating the principles of physics and chemistry relevant to the study of science and engineering. The studentswill learn to:1. Analyze&generateexperimentalskills
2. Learnandapplybasictechniquesusedinchemistry laboratory for preparation, purification and identification.
3. Employ the basic techniques used in chemistry laboratory for analyses suchas chromatography, spectroscopy,volumetrictitrations,conductometry.
4. Learnsafetyrulesinthepracticeoflaboratory investigations.
 |
|  | BasicElectrical EngineeringLab | Getanexposuretocommonelectricalcomponents and their ratings.1. Makeelectricalconnectionsbywiresof appropriate ratings.
2. Understandtheusageofcommonelectricalmeasuring instruments.
3. Understandthebasiccharacteristicsoftransformers and electrical machines.
4. Getanexposuretotheworkingofpowerelectronic converters.
 |
|  | Engineering GraphicsDesign | Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineeringsoftware |
|  | Induction Program |  |
| **Semester-II** |  |
| **Course Code** | **Course Name** | **Course Outcomes** |
| Basic Science course (BSC102) | AppliedScience (Physics and Chemistry) | 1. Impartedknowledgeaboutsimpleharmonicoscillations, mechanical and electric oscillators.
2. Learn about different kinds of damping in harmonic oscillators.Learnaboutnondispersivetransverseandlongitudinal waves in one dimension, acoustic waves and sound waves.
3. Knowaboutinterferenceanddiffractionphenomena.They
 |

|  |  |  |
| --- | --- | --- |
|  |  | willalso learn aboutMichelson Interferrometer (alsolearn whythe result was negative. Learn about why they found no significant difference between the speed of light in the direction of movement through the presumed aether, and the speed at right angles.1. UnderstandhowYoung'sdoubleslitexperimentand diffraction grating work.
2. Interactionofradiationwithmatter,Einsteincoefficients, working of different types of Lasers and their application in science, engineering and medicine.
3. Rationalizebulkpropertiesandprocessesusing thermodynamic considerations.
4. Understandtheenergiesexistinginabulkmacroscopic system.List major chemical reactions that are used in the synthesis of molecules.
5. Rationalize the terms and concepts involved in Stereochemistrylikesymmetryoperations,chirality,isomerism etc.
 |
| Basic | Mathematics-II | 1. Themathematical toolsneededinevaluating multiple |
| Science |  | integralsandtheir usage. |
| course |  | 2. Theeffectivemathematicaltoolsforthesolutions of |
| (BSC104) |  | differentialequationsthatmodelphysicalprocesses. |
|  |  | 3. Thetools ofdifferentiationandintegrationoffunctions of |
|  |  | acomplexvariablethatareusedinvarious techniques dealing |
|  |  | engineeringproblems. |
| Engineerin g Science Courses (ESC103) | Programmingfor ProblemSolving | 1. Toformulatesimplealgorithmsforarithmeticand logical problems.
2. Totranslatethealgorithmstoprograms(inC language).
3. Totestandexecutetheprogramsandcorrectsyntax and logical errors.
4. Toimplementconditionalbranching,iteration,and recursion.
5. Todecomposeaproblemintofunctionsandsynthesizea complete programusing divide and conquer approach.
6. Tousearrays,pointers,andstructurestoformulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplicationproblemsandsearchingandsortingproblems.
 |
|  |  | 8. To apply programming to solve simple numerical method problems, namelyrot finding of function, differentiation of function and simple integration. |
| Engineerin g Science Courses (ESC104) | Workshop/Manufac turingPractices | Uponcompletionofthiscourse,thestudentswillgainknowledgeof the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials. |
| Humanitie | English | Aftercompleting thiscourse,studentswill |

|  |  |  |
| --- | --- | --- |
| sandSocial Sciencesin cluding Manageme ntcoursesHSMC (101) |  | 1. AcquirebasicproficiencyinEnglishgrammarand vocabulary
2. Developgoodwritingskills
3. Demonstrateskillsrequiresforpresentations
4. Acquireskills toparticipateininterview
 |
|  | AppliedScience Lab | Thestudents willlearnto:1. Estimaterateconstantsofreactionsfromconcentrationof reactants/products as a function of time
2. Measuremolecular/systempropertiessuchassurface tension,viscosity,conductanceofsolutions,redoxpotentials, chloride content of water, etc
3. Synthesizeasmalldrugmoleculeandanalyseasalt sample
 |
|  | Programmingfor ProblemSolvingLab | 1. Toformulate thealgorithmsforsimpleproblems
2. Totranslategivenalgorithmstoaworkingandcorrect program
3. Tobeabletocorrectsyntaxerrorsasreportedbythe compilers
4. Tobeabletoidentifyandcorrectlogicalerrors encountered at run time
5. Tobeabletowriteiterativeaswellasrecursive programs
6. Tobeabletorepresentdatainarrays,stringsand structures and manipulate themthrough a program
7. Tobeabletodeclarepointersofdifferenttypesanduse them in defining self-referential structures.
8. Tobeabletocreate,readandwritetoandfromsimpletext files.
 |
|  | Workshop/Manufacturing Practices Lab EnglishPractical | 1. Uponcompletionofthislaboratorycourse,studentswillbe able to fabricate components with their own hands.
2. Theywillalsogetpracticalknowledgeofthedimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Byassemblingdifferentcomponents,theywillbeableto produce small devices of their interest.
 |
|  | English Practical | The student will acquire basic proficiency in English including readingandlisteningcomprehension,writing,andspeakingskills. |
|  | Environmental Sciences | Aftercompleting thiscourse,studentswillbeableto1. Applythebasicknowledgeofenvironmentalprotection, sustainable development, and improvement.
2. Categorize and scrutinize impact of human development on naturalresources.Providethestudentwithanunderstanding
 |

|  |  |  |
| --- | --- | --- |
|  |  | ofradioactive waste.1. Interprettheimpactofenvironmentalproblemsonsocio economic growth and human health.
2. Applyvariousstrategies,technologicalimprovement,and methods for sustainable management of environmental systemsandfortheremediationofdegradedenvironment.
3. Apply different Science and Technology (S&T) based sustainabilitysolutionsandlimitationsaswellastoidentify impactofhumanpopulationonthenaturalenvironmentand human health.
 |
| **Semester-III** |  |
| **Course Code** | **Course Name** | **Course Outcomes** |
| ESC 301 | Analog and Digital Electronics | 1. Understandthecharacteristicsoftransistors
2. Designandanalyze variousrectifier andamplifier circuits.
3. Designsinusoidalandnon-sinusoidal oscillators.
4. UnderstandthefunctioningofOP-AMPanddesignOP-AMP based circuits.
 |
| PCC-CS 301 | Datastructure&Algorithms | 1. Foragivenalgorithmstudentwill beabletoanalyzethealgorithms to determine the time andspace complexity and justify the correctness.
2. ForagivenSearchproblem(LinearSearch,BinarySearch& hashing) student will be able toimplement it.
3. ForagivenproblemofStacks,Queuesandlinkedliststudent will be able to implement it and analyze the same to determine the time and computation complexity.
4. Compareandcontrastthebenefitsofdynamicandstaticdata structures and its implementations.
5. Studentwill beabletowriteanalgorithmSelectionSort,Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
6. Student will be able to implement Graph search and traversal algorithmsanddeterminethetimeandcomputationcomplexity.
 |
| ESC 302 | Introduction to Data Science | 1. To explain how data is collected, managed and stored for data science
2. To understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists
3. To implement data collection and management scripts using MongoDB.
 |
| BSC 301 | Mathematics-III (Probability and Statistics) | 1. The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
2. The basic ideas of statistics including measures of central tendency, correlation, and regression.
 |
| Humanities for social science | Economics for Engineers | 1. Calculate the value of money according to time.
2. performs benefit/cost analysis
3. finds the most economical solution among alternatives in engineering problems.
 |
|  | Analogand Digital Electronics Lab | 1. Tostudyandunderstandthevarioustypesofcircuitsusedin Integrated Circuits
2. Tounderstandthedesignvariouslinearcircuitmathematical, logicalfunctionssuchasaddition,subtractions,AND/OR etc. operations
3. Designofanalogfilters,regulators,oscillators,etc.
4. Designofimplementation ofA/DandD/A circuits
 |
|  | Datastructure& Algorithms Lab | 1. Designandimplementalgorithmstosolve problems.
2. Chooseefficientdatastructures(Linear&Non-Linear)and apply them to solve problems.
3. Design&implementdifferentsearching&sortingalgorithms using appropriate datastructures.
4. Analyze theefficiencyofprograms basedontimecomplexity.
5. Provethecorrectnessofaprogramusingloopinvariants,pre- conditions, and post- conditions in programs.
 |
|  | Data ScienceLab using Python | 1. Learnthebasicsofgates.
2. Constructbasiccombinationalcircuitsandverifytheir functionalities.
3. Applythedesignprocedurestodesignbasicsequentialcircuits.
4. Learnabout counters.
5. LearnaboutShift registers.
6. Tounderstandthebasicdigitalcircuitsandtoverifytheir operation.
 |
|  |  |  |
| **Semester-IV** |  |
| **Course Code** | **CourseName** | **CourseOutcomes** |
| PCC- |  | 1.Mathematicalreasoning:Studentsareexpectedtouse |
| CS401 |  | mathematicalreasoningtoread,comprehend,and construct |
|  |  | mathematicalarguments.Studentswilllearnbasicconceptsof |
|  |  | mathematicallogicand proof. |
|  |  | 2.Combinatorial analysis: Studentswillcountorenumerateobjects |
|  | Discrete Mathematics | andperformcombinatorialanalysis.3.Discretestructures:Studentswilllearnthebasicconceptsofsets, permutations, relations, poset, graphs, trees. |
|  |  | 4.Algebraicstructures:Studentswilllearntheconcepts of algebraic |
|  |  | structuresanditspropertieslikehomomorphism, isomorphism. |
|  |  | 5.Groups,Rings:Students areexpected tolearndifferentalgebraic |
|  |  | structureslikesemigroups,groups,monoid, rings,field,Boolean |
|  |  | algebra. |
| PCC-CS 404 | Design and Analysis of Algorithm | 1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.
 |
| PCC-CS403 | Database Management System | 1. For a given query write relational algebra expressions for that query and optimize the developed expressions.
2. For a given specification of the requirement design the databases using E R method and normalization. ‐R method and normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query, optimize its execution using Query optimizationalgorithms.
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.
 |
| Professional Course | Data Mining | Students will get detail knowledge of Data mining and ts process and well development techniques |

|  |  |  |
| --- | --- | --- |
| MC48345 1 | Constitutionof India | Aftercompleting thiscourse,studentswillbeableto1. Understandtheconstitutionalframeworkandstateand central policies
2. Displayawarenessoffundamentalrightanddutiesofa citizen
3. Demonstrateawarenessaboutengineeringethicsand responsibilities of an engineer
4. Displayawarenessabouthumanrightsin India
 |
|  | Database Management Lab | 1. Produces an Entity-Relationship model from a realistic problem specification.
2. Uses formal design techniques to produce a database schema.
3. Manages a designed database.
4. Organizes database using SQL.
 |
|  | Design and Analysis of Algorithm lab | 1. Argue the correctness of algorithms using inductive proofs and invariants.
2. Analyze worst-case running times of algorithms using asymptotic analysis.
3. Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.
 |

|  |  |  |
| --- | --- | --- |
|  | Data mining lab | Students can able 1. To evaluate the different models of OLAP and data preprocessing.
2. To enlist various algorithms used in information analysis of Data Mining Techniques.
3. To demonstrate the knowledge retrieved through solving problems
 |
| **Semester-V** |  |
| **Course Code** | **CourseName** | **CourseOutcomes** |
| PCC-CS501 | Object Oriented Programming | 1. Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc
3. Describe the concept of function overloading, operator overloading, virtual functions, and polymorphism.
4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
5. Demonstrate the use of various OOPs concepts with the help of programs.
 |
| PCC-CS502 | Data Network | 1. Student will be able to understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model.
2. Student will be able to understand various types of transmission media, network devices; and parameters of evaluation of performance for each media and device.
3. Student will be able to understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers.
4. Student will understand the working principles of LAN and the concepts behind physical and logical addressing, subnetting and supernetting.
5. Student shall understand the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.
6. Student shall understand the principles and operations behind various application layer protocols like HTTP, SMTP, FTP.
 |
| PCC-CS503 | Architecture for Data Processing | 1. Big Data frameworks. - Mining of Big Data.- Processing of data streams. - Analysis of time series. - ecommender systems. - Analysis of social networks. Skills: - Understand important aspects of Big Data. - Ability to apply acquired knowledge for understanding data and select suitable methods for processing and analyzing Big Data. |
|  | Elective-I – Machine Learning & Computing | 1. Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. Understand the strengths and weaknesses of many popular machine learning approaches.
3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
4. Be able to design and implement various machine learning algorithms in a range of real-world applications.
 |
|  | Humanitics-I Effective Technical Communication | 1. Learning the technical phrases and writing styles like descriptive, argumentative etc for developing good technical documents for presentations or disseminating technical documents.
2. Acquisition of technical communication’s generic aspects like Reading Technical Material, Technical Writing, Listening, Thinking and using technical phrases in spoken, Knowing the parts of a technical documents  like screenshots, graphs, tabular data, data analysis, pictorial depiction.
 |
| Professional Core Courses PCC- CS504 | Analysing, Visualizing and Applying data science | 1. To identify patterns, trends and outliers in large data sets
2. To make sense of data by creating informative and engaging reports and dashboards
 |
|  | Data Network Lab | 1. Understand fundamental underlying principles of computer networking
2. Understand details and functionality of layered network architecture.
3. Apply mathematical foundations to solve computational problems in computer networking
4. Analyze performance of various communication protocols.
5. Compare routing algorithms
6. Practice packet /file transmission between nodes.
 |
|  | Object Oriented Programming lab | 1. Develop solutions for a range of problems using objects and classes.
2. Programs to demonstrate the implementation of constructors, destructors, and operator overloading.
3. Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
4. Understand generic programming, templates, file handling
 |
|  | Elective-I Machine Learning lab |

|  |
| --- |
| 1. Understandthe mathematical and statistical perspectives of machine learning algorithms through python programming.
2. Designand evaluate the unsupervised models through python in built functions.
3. **Evaluate**the machine learning models pre-processed through various feature engineering algorithms by python programming.
4. Design and applyvarious reinforcement algorithms to solve real time complex problems.
 |
|  |
|  |
|  |

 |
|  | Architecture for Data Processing Lab | 1. Learn how to manage unstructured data
2. How to fetch data if the database is not organized and has various types of data
3. Use mongoDB to analyze,fetch and explore the data
4. How to update and visualize data using MongoDB
 |
| **Semester- VI** |  |
| ESC601 | Microprocessor& Micro controller | 1. Study the Architecture of basic Microprocessors such as 8085/8085 and Microcontroller such as 8051/8751.
2. Study of opcode and programming for simple operations such as addition, subtraction, multiplication etc.
3. Study and interface various peripheral devices to the processer and controllers.
4. Design of applications using processor/controller and peripheral devices for automations.
 |
| PCC | Data visualization | 1. Students will be able to prepare data for visualization2. Students will be able to design visualizations 3. Students will be able to use web technology to create visualizations |
| PCC | Software Engineering | 1. Students will gain a broad understanding of the discipline of software engineering and its application to the development and management of software systems.2. Knowledge of basic SW engineering methods and practices, and their appropriate application.3. A general understanding of software process models such as the waterfall and evolutionary models.4. An understanding of the role of project management including planning, scheduling, risk management, etc.5. An understanding of software requirements and the SRS document architectural styles.6. An understanding of implementation issues such as modularity and coding standards. 7. An understanding of approaches to verification and validation including static analysis, reviews and testing. |
| PEC | Elective -II Artificial Intelligence | 1. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
2. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks, and other machine learning models.
3. Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
4. Demonstrate proficiency in applying scientific method to models of machine learning.
 |
| PEC | Elective -III Neural Networks and Deep learning | 1. Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
2. Implement deep learning algorithms and solve real-world problems
3. Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problem
 |
| MC | Essence and Importance of Indian Knowledge Tradition | 1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of roots of knowledge system.
2. It aims at imparting basic principles of thought process, reasoning, and inference.
 |
|  | Data visualization | 1. Understand and describe the main concepts of data visualization
2. Create ad-hoc reports, data visualizations, and dashboards using Tableau Desktop
3. Publish the created visualizations to Tableau Server and Tableau Public
 |
|  | Microprocessor and Microcontroller Lab | 1. Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
2. Work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters;
3. Troubleshoot interactions between software and hardware; d.
4. Analyze abstract problems and apply a combination of hardware and software to address the problem;
5. Use standard test and measurement equipment to evaluate digital interfaces.
 |
|  | Artificial Intelligence Lab | 1. Construct Machine learning programs for Supervised, Unsupervised and Semi supervised learning models.
2. Apply various pre-processing techniques on different datasets
3. Develop Deep learning programs for Supervised & Unsupervised learning models
 |
|  | Neural Network and Deep learning lab | 1. Evaluate, in the context of a case study, the advantages and disadvantages of deep learning neural network architectures and other approaches.
2. Implement deep learning models in Python using the PyTorch library and train them with real-world datasets.
3. Design convolution networks for handwriting and object classification from images or video.
4. Design recurrent neural networks with attention mechanisms for natural language classification, generation, and translation.
 |
| Project | Project-1 | 1. Getacquaintedtoresearch methodology
2. Surveyandanalyzetheliterature.
3. Design,implement ,analyze andtesttheproject
 |
| Semester-VII |  |
| PEC | Elective-IV (Business Intelligence with data analytics) |  improve business decisions, identify problems or issues, spot market trends, and find new revenue or business opportunities. |
| PEC | Data Science in Cloud Computing | Aftersuccessfulcompletion ofthiscourse,studentwillbeableto1. Define Cloud Computing andmemorizethedifferentCloud service and deployment models
2. Describeimportanceofvirtualizationalongwiththeir technologies.
3. Applythefundamentalconceptsindatacenterstounderstandthe tradeoffs in power, efficiency, and cost.
4. Useandexaminedifferentcloudcomputingservices
5. Analyze thecomponentsofopenstack&GoogleCloudplatform
6. DescribethekeycomponentsofAmazonwebService,Google App Engine
7. Design&developbackupstrategiesforclouddatabasedon features.
 |
| PEC | Elective-V (Social Media Analytics ) | 1. Understand the role of social media data and analytics in helping organizations achieve their goals and understand their publics;
2. Identify and select key performance indicators to accurately measure the success of social media efforts;
3. Analyze social media data using native analytics (e.g. Facebook, Twitter, Instagram) and social media measurement tools;
4. Draw meaningful insights and provide actionable and strategic recommendations based on thorough social media data analysis;
5. Develop social media measurement plans and analytics reports, and communicate findings and recommendations effectively;
 |
| PCC | Natural Language Processing | 1. Understand Natural Language Processing
2. Probabilistic model of defining language and techniques.
3. Applying Hidden Markov model and Speech Recognition.
4. Application of context free grammar and language parsing.
5. Implement probabilistic and language parsing.
6. Analyze the differentiation of semantic and discourse in terms of NLP.
 |
| Project | Project-II | 1. Able to gather knowledge over the field of research and design or plan about the proposed work.
2. Ability to locate and use technical information frommultiple sources.
3. Able to perform a literature search to review current knowledge and developments in the chosen technical area.
4. Understand the software development cycle with emphasis on different processes - requirements, design, and implementation phases.
5. Able to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.

Able to deliver a seminar on the general area of work being undertaken and specific contributions to that field and prepare a formal re |
|  | Elective-VI ( Data science in Cloud Computing) Lab | Studentswillableto:1. ImplementVirtualizationusingdifferenttypesofHypervisors
2. StudyandimplementCollaborationwithdifferentSoftwareAs Services
3. DescribestepstoperformondemandApplicationdeliveryusing Ulteo .
4. Examinetheinstallationandconfiguration ofOpenstack cloud
5. Analyzeandunderstandthefunctioningofdifferent googleservices .
6. ImplementationofPlatformasaServiceusingGoogleApp Engine

Design&Synthesize Storageasaserviceusingown Cloud |
|  | Elective-IV (Business Intelligence with data analytics) Lab | 1. Describe the concepts and components of Business Intelligence (BI).

2. Critically evaluate use of BI for supporting decision making in an organisation.3. Understand and use the technologies and tools that make up BI (e.g. Data warehousing, Data reporting and use of Online analytical processing (OLAP)).4. Understand and design the technological architecture that underpins BI systems. |
|  | Natural Language Processing lab | Students will be able to: * 1. Process the text data at syntactic and semantic level.
	2. Extract the key information from Text data.
	3. Analyze the text content to provide predictions related to a specific domain using language models.
 |
|  | Elective-V (Social Media Analytics ) Lab | 1. Understand characteristics and types of social media networks.
2. Use social media analytics tools for business
3. Collect, monitor , store and track social media data
4. Analyze and visualize social media data from multiple platforms
 |

|  |  |
| --- | --- |
| Semester-VIII |  |
|  | Internship | Internships capture an intangible aspect of higher learning that is often lacking in classrooms and textbooks: the value of real-world experience. Apply Theoretical Knowledge in the Real WorldExpand on Your Transferrable SkillsDevelop Professional ConnectionsDirect Job Offers Are More Likely |
| OEC | Open Elective-II (Cyber law and Ethics ) | 1. Make Learner Conversant With The Social And Intellectual Property Issues Emerging From ‘Cyberspace.
2. Explore The Legal And Policy Developments In Various Countries To Regulate Cyberspace
3. Develop The Understanding Of Relationship Between Commerce And Cyberspace; And
4. Give Learners In Depth Knowledge Of Information Technology Act And Legal Frame Work Of Right To Privacy, Data Security And Data Protection.
5. Make Study On Various Case Studies On Real Time Crimes.
 |
| Project | Project-III | 1. Able to demonstrate a sound technical knowledge of their selected project topic.
2. Able to design engineering solutions to complex problems utilising a systems approach.
3. Able to produce progress reports or maintain a professional journal to establish work completed, and to schedule additional work within the time frame specified for the project.
4. Able to deliver a seminar on the general area of work being undertaken and specific contributions to that field.
5. Prepare a formal report describing the work undertaken and results obtained so far.
6. Able to present the work in a forum involving poster presentationsanddemonstrationsofoperationalhardware and software.
 |