# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
## Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in the light of NEP-2020
Bachelor of Technology (CSE with Specialization in Information and Cyber Security)
SEMESTER-VI (2023-27)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTCS601N | DCC | Compiler Design | 60 | 20 | 20 | 30 | 20 | 2 | 1 | 2 | 4 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

## COURSE OBJECTIVES:
The student will have ability to:
1. To introduce the major concept areas of language translation and compiler design
2. To enrich the knowledge in various phases of compiler and its use
3. To provide understanding of steps of programming necessary for constructing a compiler

## COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Ability to apply the knowledge of lex tool & yacc tool to develop a scanner & parser
2. Ability to design and develop software system for backend of the compiler
3. Ability to comprehend and adapt to new tools and technologies in compiler design

## SYLLABUS
### UNIT I — 8 HOURS
**Introduction:** Compiler**,** Compilers analysis of the source program**,** Phases of a compiler**,** Cousins of the Compiler, Grouping of Phases and Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering and Specification of Tokens.

### UNIT II — 10 HOURS
**Syntax Analysis:** Role of the parser, Writing Grammars, Context-Free Grammars, Top-Down parsing, Recursive Descent Parsing, Predictive Parsing, Bottom-up parsing, Shift Reduce Parsing, Operator Precedent Parsing, LR Parsers, SLR Parser – Canonical LR Parser – LALR Parser.

### UNIT III — 9 HOURS
**Intermediate Code Generation:** Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate languages**,** Declarations, Assignment Statements, Boolean Expressions, Case Statements, Three Address code, Back patching, Procedure calls.

### UNIT IV — 10 HOURS
**Code Optimization and Run Time Environments:** Introduction, Principal Sources of Optimization, Optimization of basic Blocks, DAG representation of Basic Blocks - Introduction to Global Data Flow Analysis, Runtime Environments, Source Language issues, Storage Organization, Storage Allocation strategies, Access to non-local names, Parameter Passing, Error detection and recovery.

### UNIT V — 9 HOURS
**Code Generation:** Issues in the design of code generator, The target machine, Runtime Storage management, Basic Blocks and Flow Graphs, Next-use Information, A simple Code generator, Peephole Optimization.

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## TEXTBOOKS:

1. Alfred V. Aho, Jeffrey D. Ullman, *Compilers: Principles, Techniques and Tools*, Pearson Education Asia, 2012
2. Jean Paul Tremblay, Paul G Serenson, *The Theory and Practice of Compiler Writing*, BS Publications, 2005


## REFERENCE:

1. Allen I. Holub, *Compiler Design in C*, Prentice Hall of India, 2003
2. C. N. Fischer and R. J. LeBlanc, *Crafting a compiler with C*, Benjamin Cummings, 2003
3. Henk Alblas and Albert Nymeyer, *Practice and Principles of Compiler Building with C*, PHI, 2001
4. Kenneth C. Louden, *Compiler Construction: Principles and Practice*, Thompson Learning, 2003
5. D. M. Dhamdhere, *Compiler Construction Principles and Practice*, 2nd Ed., Macmillan India Ltd., New Delhi, 2008


## LIST OF PRACTICALS
1. To study the Lex Tool.
2. To study the Yacc Tool.
3. Write a program to implement Lexical Analyzer to recognize few patterns of C.
4. Write a program to implement the Recursive Descent Parser.
5. Write a program to implement the Computation of FIRST and FOLLOW of variables of grammar.
6. Write a program to compute the leading and trailing symbols of grammar.
7. Write a program to implement Operator Precedence Parser.
8. Write a program to implement SLR parser.
9. Write a program to check the data types.
10. Write a program to implement the generation of three address code.
11. Write a program to implement the computation of postfix notation.
12. Write a program to implement the computation of Quadruple.

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| BTCS602N | DCC | Object Oriented Analysis and Design | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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## COURSE OBJECTIVES:
The student will have ability to:
1. To learn the concept of Object-Oriented Software Development Process
2. To get acquainted with UML Diagrams
3. To understand Object Oriented Analysis Processes

## COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Understand Object Oriented Software Development Process
2. Gain exposure to Object Oriented Methodologies & UML Diagrams
3. To apply Object Oriented Analysis Processes for projects

## SYLLABUS
### UNIT I — 10 HOURS
**Introduction:** Object Orientated Technology, Development and OO Modeling History. Modeling Concepts: Modeling design Technique, Three Models, Class Model, State Model and Interaction model.

### UNIT II — 9 HOURS
**Class Modeling:** Object and class concepts, link and association, Generalization and Inheritance, Advanced class modeling- aggregation, Abstract class meta data, constraints. State Modeling: Event, state, Transition and conditions, state diagram, state diagram behavior, concurrency, Relation of Class and State models. Interaction Modeling: Use case Models, sequence models, activity models

### UNIT III — 8 HOURS
**Analysis and Design:** Development Life cycle, Development stages, Domain Analysis-Domain class model, domain state model, domain interaction model, Iterating and analysis. Application Interaction model, Application class model, Application state Model, Adding operation.

### UNIT IV — 7 HOURS
**System Design:** Estimating Performance, Making a reuse plan, breaking system into sub systems identifying concurrency, allocation of subsystems, management of data storage, Handling Global resources, choosing a software control strategy, Handling boundary condition, common Architectural style.

### UNIT V — 8 HOURS
**Class design:** Overview of class design, designing algorithms recursing downward, refactoring, design optimization, Adjustment of Inheritance, Rectification of Behavior.

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## TEXTBOOKS:
1. Michael Blaha and J. Rumbugh, *Object oriented Modeling and design with UML*, Pearson Education

## REFERENCE:
1. Satzinger, Jackson and Burd, *Object oriented Analysis and design with the Unified Process*, CENGAGE Learning.
2. O. Docherty, *Object Oriented Analysis and Design Understanding, System Development with UML2.0*, Wiley India.

## LIST OF PRACTICALS
1. How to write a Problem Statement
2. Perform the system analysis: Requirement analysis, SRS.
3. Perform the function oriented diagram: DFD and Structured chart.
4. Perform the user's view analysis: Use case diagram.
5. Draw the structural view diagram: Class diagram, object diagram.
6. Draw the behavioral view diagram: Sequence diagram, Collaboration diagram.
7. Draw the behavioral view diagram: State-chart diagram, Activity diagram.
8. Draw the implementation view diagram: Component diagram.
9. Draw the environmental view diagram: Deployment diagram.

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| BTCS603N | DCC | Introduction to Cloud Computing | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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## COURSE OBJECTIVES:

The student will have ability to:

1. Analyze the SAAS, PAAS IAAS services of Cloud Computing to represent how engineering agility in an organization can be created.
2. Assess the exploitation of web services from cloud computing.
3. Configure essential infrastructural components used for implementing Cloud.
4. Significantly study case studies to derive the most excellent practice model to be appropriate when deploying cloud-based applications.

## COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Investigate the trade-offs among deploying applications in the cloud and over the local infrastructure.
2. Compute real-world problems security, privacy issues using cloud computing through group collaboration.
3. Development and Deployment applications over commercial cloud computing infrastructures.
4. Analyze and investigation of application & hardware performance, scalability, and availability of the underlying cloud technologies and software.

## SYLLABUS

### UNIT I — 10 HOURS

**Overview of Cloud Computing:** Introduction- Evolution, Shift from distributed computing to cloud computing; principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service-oriented computing and cloud environment, Advantages, Service & Deployment Models, Infrastructure, and Consumer View, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications.

### UNIT II — 8 HOURS

**Cloud Computing Technology**- Client systems, Networks, server systems and security from services perspectives, security and privacy issues; accessing the cloud with platforms and applications; Cloud storage

### UNIT III — 9 HOURS

**Working with Cloud:** Infrastructure as a Service – conceptual model and working, Platform as a Service – conceptual model and functionalities. Software as a Service –conceptual model and working. Trends in Service provisioning with clouds. Working on Microsoft Azure & IBM Smart Cloud.

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| BTCS603N | DCC | Introduction to Cloud Computing | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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**9 HOURS**

## UNIT IV

**Using Cloud Services:** Cloud collaborative applications and services – case studies with calendars, schedulers, and event management; cloud applications in project management. Amazon Web Services & applications, AWS EC2, S3, Cloud Analytics, Cloud Open Stack

## UNIT V

**8 HOURS**

**Case studies**- Microsoft Azure, Google App Engine, IBM Smart Cloud and Open source clouds,-Open-Nebula, Sales force and Eucalyptus, Cloud Simulation

## TEXTBOOKS:

1. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, *Cloud Computing: A Practical Approach*, The McGraw-Hill, 2010.

## REFERENCE:

1. Kumar Saurabh, *Cloud Computing*, Wiley Pub, 2012.
2. Krutz , Vines, *Cloud Security*, Wiley Pub, 2013.
3. Sosinsky, *Cloud Computing*, Wiley Pub, 2012.
4. Murray Woodside, John Chinneck and Marin Litiou, *Adaptive Cloud Deployment Using Persistence Strategies and Application Awareness,* Page(s): 277–290, IEEE Xplore, 2017.
5. Buyya, Selvi , *Mastering Cloud Computing*, The McGraw-Hill.
6. Michael Miller, *Cloud computing – Web based Applications*, Pearson Publishing, 2011

## LIST OF PRACTICALS

1. Service deployment & Usage over cloud using Virtual Box.
2. Performance evaluation of services over cloud using VMware tool.
3. Working of Goggle Drive to make spreadsheet.
4. Working on Heroku for Cloud application deployment.
5. Working on Aneka services for Cloud application.
6. Working on services of Google App Engine.
7. Working on Application deployment & services of Microsoft Azure.
8. Working on Application deployment & services of IBM Smart Cloud.
9. Working and configuration of Euceliptus.
10 Deployment &Services of Amazon Web Services.

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| BTDSE611M | DSE | Block Chain | 60 | 20 | 20 | 0 | 0 | 3 | 0 | 0 | 3 |

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## COURSE OBJECTIVES:
The student will have ability to:
1. Provide conceptual understanding of how block chain technology can be used to innovate and improve business processes.
2. Covers the technological underpinning of block Chain operations in both theoretical and practical implementation of solutions using block Chain technology.

## COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Understand block chain technology.
2. Develop block chain based solutions and write smart contract using Hyper ledger Fabric and Ethereum frameworks.
3. Build and deploy block chain application for on premise and cloud based architecture.
4. Integrate ideas from various domains and implement them using block chain technology indifferent perspectives.

## SYLLABUS
### UNIT I — 10 HOURS
**Introduction:** Overview of Block chain, Public Ledgers, Bit coin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain.
Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic crypto currency.

### UNIT II — 10 HOURS
**Understanding Block chain with Crypto currency:** Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.
Working with Consensus in Bitcoin**:** Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

### UNIT III — 9 HOURS
**Understanding Block chain for Enterprises:** Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus

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| BTDSE61 1M | DSE | Block Chain | 60 | 20 | 20 | 0 | 0 | 3 | 0 | 0 | 3 |

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models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport – Shostak - Pease BFT Algorithm, BFT over Asynchronous systems.

**UNIT IV** **8 HOURS**

**Enterprise application of Block chain:** Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain.

**UNIT V** **8 HOURS**

**Block chain application development:** Hyper ledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyper ledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda.

**TEXTBOOKS:**


1. Melanie Swan, *Block Chain: Blueprint for a New Economy*, O'Reilly, 2015.


**REFERENCE:**


1. Josh Thompsons, *Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming*.
2. Daniel Drescher, *Block Chain Basics*, 1st Ed., Apress, 2017.
3. Anshul Kaushik, *Block Chain and Crypto Currencies*, Khanna Publishing House, Delhi.
4. Imran Bashir, *Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained*, Packt Publishing.
5. Ritesh Modi, *Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain*, Packt Publishing.
6. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd and Venkatraman.Ramakrishna, *Hands-On Block Chain with Hyper ledger: Building Decentralized Applications with Hyper ledger Fabric and Composer*, Import, 2018

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| **BTDSE612M** | DSE | **Robotics** | **60** | **20** | **20** | **0** | **0** | **3** | **0** | **0** | **3** |

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## COURSE OBJECTIVES:
The student will have ability to:
1. Impart knowledge about industrial robots for their control and design.

## COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Perform kinematic and dynamic analyses with simulation.
2. Design control laws for a robot.
3. Integrate mechanical and electrical hardware for a real prototype of robotic device.
4. Select a robotic system for given application.

## SYLLABUS
### UNIT I — 8 HOURS
**Introduction to Robotics:** Types and components of a robot, Classification of robots, closed-loop and open-loop control systems. Kinematics systems; Definition of mechanisms and manipulators, Social issues and safety.

### UNIT II — 8 HOURS
**Robot Kinematics and Dynamics:** Kinematic Modeling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Jacobean, Singularity, and Statics Dynamic Modeling: Equations of motion: Euler-Lagrange formulation

### UNIT III — 9 HOURS
**Sensors and Vision System:** Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc. Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/ Similarity/ Affine/ Projective transformations. Vision applications in robotics.

### UNIT IV — 8 HOURS
**Robot Control:** Basics of control: Transfer functions, Control laws: P, PD, PID. Non-linear and advanced controls.

### UNIT V — 9 HOURS
**Robot Actuation Systems:** Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.
**Control Hardware and Interfacing:** Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.

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## TEXTBOOKS:


1. S. K. Saha, *Introduction to Robotics*, 2nd Ed., McGraw-Hill Higher Education, New Delhi, 2014.


## REFERENCE:


1. A. Ghosal, *Robotics*, Oxford, New Delhi, 2006.
2. B. Niku Saeed, *Introduction to Robotics: Analysis, Systems, Applications*, PHI, New Delhi.
3. R. K. Mittal and I. J. Nagrath, *Robotics and Control*, Tata McGraw Hill.
4. S. Mukherjee, *Robotics and Automation*, Khanna Publishing House, Delhi.
5. J. J. Craig, *Introduction to Robotics: Mechanics and Control*, Pearson, New Delhi, 2009
6. Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, *Robot Modeling and Control*, John Wiley and Sons, Inc, 2005
7. Steve Heath, *Embedded System Design*, 2nd Ed., Newnes, Burlington, 2003.
8. R. Merzouki, A. K. Samantaray, P. M. Phathak and Bouamama B. Ould, *Intelligent Mechatronic System: Modeling, Control and Diagnosis*, Springer.

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| BTDSE613M | DSE | Internet of Things | 60 | 20 | 20 | 0 | 0 | 3 | 0 | 0 | 3 |

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## COURSE OBJECTIVES:
The student will have ability to:
1. Impart necessary and practical knowledge of components of Internet of Things.
2. Develop skills required to build real-life IoT based projects.

## COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Understand internet of Things and its hardware and software components
2. Interface I/O devices, sensors & communication modules
3. Remotely monitor data and control devices
4. Develop real life IoT based projects

## SYLLABUS
### UNIT I — 10 HOURS
**Introduction to IoT:** Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service (XaaS), Role of Cloud in IoT, Security aspects in IoT.

### UNIT II — 9 HOURS
**Elements of IoT:** Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication. Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

### UNIT III — 8 HOURS
**IoT Application Development:** Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration.

### UNIT IV — 7 HOURS
**Device data storage:** Unstructured data storage on cloud/local server, Authentication, authorization of devices.

### UNIT V — 8 HOURS
**IoT Case Studies:** IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

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| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTDSE613M | DSE | Internet of Things | 60 | 20 | 20 | 0 | 0 | 3 | 0 | 0 | 3 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

## TEXTBOOKS:


1. Vijay Madisetti, Arshdeep Bahga, *Internet of Things: A Hands on Approach*, University Press.
2. Dr. S. R. N. Reddy, Rachit Thukral and Manasi Mishra, *Introduction to Internet of Things: A practical Approach*, ETI Labs.


## REFERENCE:


1. Pethuru Raj and Anupama C. Raman, *The Internet of Things: Enabling Technologies, Platforms, and Use Cases*, CRC Press
2. Jeeva Jose, *Internet of Things*, Khanna Publishing House, Delhi.
3. Adrian McEwen, *Designing the Internet of Things*, Wiley.
4. Raj Kamal, *Internet of Things: Architecture and Design*, McGraw Hill.
5. CunoPfister, *Getting Started with the Internet of Things*, O Reilly Media.

# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
## Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in the light of NEP-2020
Bachelor of Technology (CSE with Specialization in Information and Cyber Security)
SEMESTER-VI (2023-27)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTCS708N | DSE | Introduction to Data science | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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## COURSE OBJECTIVES:
The student will have ability to:
1. The objective of this course is to impart the necessary knowledge of the mathematical foundations needed for data science and develop the programming skills required to build data science applications.

## COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Demonstrate understanding of the mathematical foundations needed for data science.
2. Collect, explore, clean, munge and manipulate data.
3. Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkits

## SYLLABUS
### UNIT I — 6 HOURS
**Introduction to Data Science:** Concept of Data Science, Traits of Big data, Web Scraping, Analysisvs Reporting.

### UNIT II — 9 HOURS
**Introduction to Programming Tools for Data Science:** Toolkits using Python: Matplotlib, NumPy,Scikit-learn, NLTK, Visualizing Data: Bar Charts, Line Charts, Scatterplots, Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.

### UNIT III — 6 HOURS
**Mathematical Foundations:** Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation, Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem, Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, Phacking, Bayesian Inference.

### UNIT IV — 8 HOURS
**Machine Learning:** Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression-model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random

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forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks-Learning And Generalization, Overview of Deep Learning.

**UNIT V** **5 HOURS**

**Case Studies of Data Science Application:** Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.

## TEXTBOOKS:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media.
2. Aurélien Geron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media.
3. Jain V.K., “Data Sciences”, Khanna Publishing House, Delhi.
4. Jain V.K., “Big Data and Hadoop”, Khanna Publishing House, Delhi.
5. Jeeva Jose, “Machine Learning”, Khanna Publishing House, Delhi.
6. Chopra Rajiv, “Machine Learning”, Khanna Publishing House, Delhi.
7. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press http://www.deeplearningbook.org
8. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers.

## LIST OF PRACTICALS:

1. Write a programme in Python to predict the class of the flower based on available attributes.
2. Write a programme in Python to predict if a loan will get approved or not
3. Write a programme in Python to predict the traffic on a new mode of transport
4. Write a programme in Python to predict the class of the user.
5. Write a programme in Python to identify the tweets which are hate tweets and which are not.
6. Write a programme in Python to predict the age of the actors.
7. Mini project to predict the time taken to solve a problem given the current status of the user

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SEMESTER-VI (2023-27)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTCS607N | PW | Minor Project | 0 | 0 | 0 | 60 | 40 | 0 | 0 | 4 | 2 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

### Course Objectives:

This course is the masters by coursework Minor Project.
A Minor Project is a substantial work of supervised research or development, requiring the equivalent of about four to six months full-time work from start to finish. A Project involves identifying a task or problem, searching and reviewing relevant literature, a proposed, implemented, and critically analyzed solution to the task or problem, and a written report describing the problem, the relevant literature, the solution, and its relation to other work in the area.

**Note:** This course includes a work integrated learning experience in which your knowledge and skills will be applied and assessed in a real or simulated workplace context and where feedback from industry and/ or community is integral to your experience.

### COURSE OUTCOMES

This course contributes to the following program learning outcomes:

- **Enabling Knowledge:**

You will gain skills as you apply knowledge with creativity and initiative to new situations. In doing so, you will:

- Demonstrate mastery of a body of knowledge that includes recent developments in Information Technology

Recognize and use research principles and methods applicable to Information Technology.

You will learn to accurately and objectively examine, and critically investigate Information Technology (IT) concepts, evidence, theories or situations, in particular to:

- Analyze and model complex requirements and constraints for the purpose of designing and implementing software artifacts and ITsystems
- Evaluate and compare designs of software artifacts and IT systems on the basis of organizational and user requirements.

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SEMESTER-VI (2023-27)

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| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTCS607N | PW | Minor Project | 0 | 0 | 0 | 60 | 40 | 0 | 0 | 4 | 2 |

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- **Problem Solving:**

Your capability to analyze complex problems and provide suitable solutions will be extended as you learn to: design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification.

- **Communication:**

You will learn to communicate effectively with a variety of audiences through a range of modes and media, in particular to: interpret abstract theoretical propositions, choose methodologies, justify conclusions and defend professional decisions to both IT and non-IT personnel via technical reports of professional standard and technical presentations.

- **Responsibility:**

You will be required to accept responsibility for your own learning and make informed decisions about judging and adopting appropriate behavior in professional and social situations. This includes accepting the responsibility for independent life-long learning and a high level of accountability. Specifically, you will learn to: effectively apply relevant standards, ethical considerations, and an understanding of legal and privacy issues to designing software applications and IT systems.

- **Research and Scholarship:**

You will have technical and communication skills to design, evaluate, implement, analyze and theorize about developments that contribute to professional practice or scholarship; specifically you will have cognitive skills:

- To demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice or scholarship
- To plan and execute a substantial research-based project, capstone experience and/or piece of scholarship.

## Course Learning Outcomes

Upon successful completion of this course you should be able to:

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| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTCS607N | PW | Minor Project | 0 | 0 | 0 | 60 | 40 | 0 | 0 | 4 | 2 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

- Identify a task or problem relevant to /or IT
- Search and review of the relevant literature
- Propose a solution to the task or problem
- Develop a software and/or algorithmic solution to the task or problem
- Implement solutions to meet high quality requirements developed by the supervisor
- Carry out research under supervision
- Present the research in a written form like that used for published papers
- Present the research in an oral seminar.

### Overview of Learning Activities

A Minor project is a substantial work of supervised research or software development. You will choose an academic staff member as your supervisor to work on a research project. To successfully complete the course, you must demonstrate research skills: ability to undertake research under supervision, ability to analyze, develop, and present the research in a written form like that used for published papers, and ability to present the research in an oral seminar.

In this course, you are expected to carry out research activities including implementing a complete solution to the problems identified by the supervisor, critical analysis of results, and completing a written Project. The major deadline for this course is the delivery of the Minor Project by the end of the semester.

### Overview of Assessment

You must satisfactorily complete each of the following assessment tasks for this course:

- Research project comprising an implemented and critically analyzed solution to the task or problem.
- Written report (final Project) describing the problem, the relevant literature, the solution, and its relation to other work in the area
- Seminar on your research (of 20 minutes) soon after your Project is submitted.

The Minor Project is assessed on its merits as a research publication. Each Project is examined by two academics, usually from within the Institute.