INTRODUCTION TO ARTIFICIAL INTELLIGENCE		SEMESTER	V
Course Code	**BBCA501**	**CIE Marks**	**50**
Teaching Hours/Week (L: P: SDA)	**04:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**50**	**Total Marks**	**100**
Credits	**4**	**Exam Hours**	**3**

COURSE OBJECTIVES:

After the successful completion of the course, the student will be able to

- Introduce the fundamentals and foundations of Artificial Intelligence.
- Familiarize students with intelligent agents and search techniques.
- Provide knowledge of knowledge representation and logical reasoning methods.
- Develop understanding of machine learning techniques and models.
- Explain applications of AI in language processing, vision, speech, and robotics.

MODULE-1

Introduction- What is Artificial Intelligence, Foundations of AI, History, State of the Art. Intelligent Agents- Agents and Environments- Specifying the task environment, Properties of task environments, Agent based programs-Structure of Agents, Types of agents- Simple reflex agents, Model-based reflex agents, Goal-based agents; and Utility-based agents.

Textbook: Chapter 1.1 to 1.4, Chapter 2.1 to 2.4

Number of Hours: 10

MODULE-2

Problem Solving by Searching-Problem-Solving Agents, Well-defined problems and solutions, examples Problems, Searching for Solutions, Uninformed Search Strategies Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bidirectional search.

Textbook: Chapter 3.1 to 3.4

Number of Hours: 10

MODULE-3

Knowledge Representation - Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic, First-Order Logic-Syntax and Semantics of First-Order Logic, Using First-Order Logic.

Textbook: Chapter 7.1 to 7.7, 8.2, 8.3

Number of Hours: 10

MODULE-4

Learning– Forms of Learning, Supervised Learning, Learning Decision Trees, Regression and Classification with Linear Models, Artificial Neural Networks, Support Vector Machines.

Textbook: Chapter 19.1-19.8

Number of Hours: 10

MODULE-5

Applications of AI - Natural Language Processing, Text Classification, and Information Retrieval, Speech Recognition, Image processing and computer vision, Robotics.

Textbook: Chapter 24.1 to 24.6

Number of Hours: 10

Teaching Methodology: Chalk and talk method / PowerPoint Presentation

COURSE OUTCOMES:

CO 1. Explain the fundamentals of Artificial Intelligence and intelligent agents.

CO 2. Apply search algorithms to solve AI problems.

CO 3. Illustrate knowledge representation and logical reasoning techniques.

CO 4. Analyze and implement basic machine learning methods.

CO 5. Explain applications of AI in NLP, computer vision, speech processing, and robotics.

Suggested Learning Resources:

Text Books:

1. Stuart Russell, Peter Norvig: Artificial Intelligence: A Modern Approach, 4th Edition (2020).
2. Tom Mitchell, “Machine Learning”, 1st Edition, McGraw-Hill,2017

Web Links:

1. NPTEL: https://www.youtube.com/watch?v=GHpchgLoDvI
2. https://www.coursera.org/learn/introduction-to-ai

INTRODUCTION TO DATA SCIENCE		SEMESTER	V
Course Code	**BBCA502**	**CIE Marks**	**50**
Teaching Hours/Week (L: P: SDA)	**04:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**50**	**Total Marks**	**100**
Credits	**4**	**Exam Hours**	**3**

COURSE OBJECTIVES:

After the successful completion of the course, the student will be able to

- Introduce the fundamentals of data science and big data concepts.
- Familiarize students with the data science process and data analysis techniques.
- Provide knowledge of machine learning methods and their applications.
- Develop understanding of techniques for handling and processing large datasets.
- Explain the basics of big data frameworks, NoSQL databases, and text mining applications.

MODULE-1

Preparing And Gathering Data And Knowledge: Benefits and uses of data science and big data - facets of data: Structured data, Unstructured data, Natural Language, Machine generated data, Audio, Image and video streaming data, The data science process, The Big data Eco system and data science, Distributed file system, Distributed Programming framework, Data Integration frame work, Machine learning Framework, NoSQL Databases, Scheduling tools, Benchmarking Tools, System Deployment, Service programming and Security.

Textbook 1: Chapter 1.1, 1.2, 1.3, 1.4

Number of hours: 10

MODULE-2

The Data Science Process: Overview of the data science process- defining research goals and creating project charter, retrieving data, cleansing, integrating and transforming data, exploratory data analysis, Build the models, presenting findings and building application on top of them.

Textbook 1: Chapter 2.1 to 2.7

Number of hours: 10

MODULE-3

Machine Learning: Application for machine learning in data science- Tools used in machine learning – Modeling Process – Training model – Validating model – Predicting new observations –Types of machine learning Algorithm : Supervised learning algorithms, Unsupervised learning algorithms, Semi-supervised learning.

Textbook: Chapter 3.1 to 3.4

Number of hours: 10

MODULE-4

Handling large data: The problems you face when handling large data, General techniques for handling large volumes of data, General programming tips for dealing with large data sets, Predicting malicious URLs, Building a recommender system inside a database.

Textbook 1: Chapter 4.1 to 4.5

Number of hours: 10

MODULE-5

First Step in big data: Distributing data storage and processing with frameworks - Case study: e.g, Assessing risk when lending money.

NoSQL: Introduction, What disease is this?

Text mining and Text analysis: Text mining in the real world, Text mining techniques.

Textbook: Chapter 5.1, 5.2, 6.1, 6.2, 8.1, 8.2

Number of Hours: 10

Teaching Methodology: Chalk and talk method / PowerPoint Presentation

COURSE OUTCOMES:

CO 1. Explain fundamentals of data science, big data, and data types.
CO 2. Apply the data science process for data analysis and model development.
CO 3. Analyze and implement machine learning techniques for data-driven problems.
CO 4. Demonstrate methods for handling and processing large-scale data.
CO 5. Illustrate applications of big data, NoSQL, and text mining techniques.

Suggested Learning Resources:

Textbooks:

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman and Mohamed Ali,Manning Publications, 2016.
2. Doing Data Science, Straight Talk from the Frontline, Cathy O'Neil, Rachel Schutt, O' Reilly, 1st edition, 2013.

Web Links:

1. https://www.simplilearn.com/tutorials/data-science-tutorial/what-is-data-science
2. https://www.coursera.org/learn/what-is-datascience
3. https://www.youtube.com/watch?v=ua-CiDNNj30

CLOUD COMPUTING		SEMESTER	V
Course Code	**BBCA503**	**CIE Marks**	**50**
Teaching Hours/Week (L: P: SDA)	**04:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**50**	**Total Marks**	**100**
Credits	**4**	**Exam Hours**	**3**

COURSE OBJECTIVES:

After the successful completion of the course, the student will be able to

- To introduce the fundamentals and concepts of cloud computing.
- To explain architectures of parallel and distributed computing systems.
- To understand virtualization techniques and virtualization platforms.
- To study cloud computing architectures, service models, and deployment models.
- To familiarize students with industrial cloud platforms and cloud applications.

MODULE-1

Introduction to Cloud Computing: The vision of Cloud Computing, Defining a cloud, A closer look, Cloud computing reference model, Characteristics and benefits, Challenges ahead, Distributed systems, Virtualization, Web 2.0, Service oriented computing, Utility oriented computing, Building cloud computing environments

Textbook 1: Chapter 1.1 to 1.3

Number of Hours: 10

MODULE-2

Architectures for parallel and distributed computing: Eras of computing, Parallel Vs Distributed computing, Elements of parallel computing, Elements of distributed computing, Technologies for distributed computing.

Textbook 1: Chapter 2.1 to 2.5

Number of Hours: 10

MODULE-3

Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples: Xen: Para virtualization, VmWare: Full virtualization, Microsoft Hyper – V.

Textbook 1: Chapter 3.1 to 3.6

Number of Hours: 10

MODULE-4

Cloud computing architecture: Introduction, Cloud reference model: Architecture, IaaS, PaaS, SaaS, Types of Clouds: Public, Private, Hybrid and Community clouds, Economics of the cloud, Open challenges.

Textbook 1: Chapter 4.1 to 4.5

Number of Hours: 10

MODULE-5

Cloud Platforms in Industry: Amazon web services; Google AppEngine; Microsoft Azure

Cloud Applications: Scientific applications: Healthcare; Biology; Geo-Science, Business and Consumer applications: CRM & ERP; Productivity; Social networking, Media applications, Multiplayer online gaming

Textbook 1: Chapter 9.1 to 9.3, Chapter 10.1 to 10.2

Number of Hours: 10

Teaching Methodology: Chalk and talk method / PowerPoint Presentation

COURSE OUTCOMES:

CO 1. Understand fundamentals of cloud computing, distributed systems, and virtualization.

CO 2. Explain architectures and technologies for parallel and distributed computing.

CO 3. Describe virtualization techniques and virtualization platforms.

CO 4.	Illustrate cloud architecture, service models, and deployment models.
CO 5.	Identify major cloud platforms and cloud-based applications.

Suggested Learning Resources:

Books:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering Cloud Computing Foundations and Applications Programming", Elsevier, 2013.
2. K Chandrasekaran "Essentials of Cloud Computing" , CRC Press, 2015.

Links:

1. NPTEL: https://youtu.be/ZHCtVZ6cjdg
2. https://explore.skillbuilder.aws/learn/courses/134/aws-cloud-practitioner-essentials

ADVANCED JAVA		SEMESTER	V
Course Code	**BBCA504A**	**CIE Marks**	**50**
Teaching Hours/Week (L: P: SDA)	**4:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**50**	**Total Marks**	**100**
Credits	**04**	**Exam Hours**	**03**

COURSE OBJECTIVES:

- Introduce the concepts and architecture of Java Applets.
- Familiarize students with event handling mechanisms in Java.
- Develop GUI programming skills using AWT components and graphics.
- Provide knowledge of servlet programming and web application development.
- Explain database connectivity and transaction handling using JDBC.

MODULE-1

Applets: Applet Basics, Applet Types, Applet Architecture, An Applet Skeleton, Applet Initialization and Termination, Overriding update(), Simple Applet Display Methods, Requesting Repainting, A Simple Banner Applet, Using the Status Window, The HTML APPLET Tag, Passing Parameters to Applets, Improving the Banner Applet, getDocumentBase() and getCodeBase(), AppletContext and showDocument(), The AudioClip Interface, The AppletStub Interface, Outputting to the Console.

Textbook 1: Chapter 23

Number of Hours: 10

MODULE-2

Event Handling: Event Handling Mechanism, The Delegation Event Model, Event Classes, The Keyevent Class, Source Of Events, Event Listener Interface, Using Delegation Event Model, Adapter Classes, Inner Classes.
Textbook 1: Chapter 24

Number of Hours: 10

MODULE-3

AWT: AWT Classes, Windows Fundamental, Working With Frame Windows, Creating A Frame Window In An Awt-Base Applet, Creating Windows Program, Displaying Information Within An Window, Introducing Graphics, Working With Color, Setting The Paint Mode, Working With Fonts, Managing Text Output Using Fontmetrics.
Textbook 1: Chapter 25

Number of Hours: 10

MODULE-4

Servlet: Background, The lifecycle of a servlet, Servlet Development Options, Using Tomcat, A Simple Servlet, The Servlet API, The javax.servlet Package, Reading Servlet Parameters, The javax.servlet.http Package, Handling HTTP Request and Responses, Using Cookies, Session Tracking.
Textbook 1: Chapter 38

Number of Hours: 10

MODULE-5

JDBC: The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of JDB Process, JDBC Connection, Statement Objects, ResultSet, Transaction Processing, Metadata, Data Types, Exceptions.
Textbook 2: Chapter 10

Number of Hours: 10

Teaching Methodology: Chalk and talk method / PowerPoint Presentation

COURSE OUTCOMES:

CO 1. Explain the architecture and working of Java Applets.
CO 2. Apply event handling techniques using delegation event model and listeners.

CO 3. Develop GUI applications using AWT classes, graphics, and window components.
CO 4. Design web applications using servlets and session management techniques.
CO 5. Implement database applications using JDBC connectivity and transaction processing.

Suggested Learning Resources:

Books

1. Herbert Schildt, The Java 2 : Complete Reference, Fourth edition,TMH,
2. Jim Keogh, J2ME: The complete Reference, McGrawHill
3. Balaguruswamy, Programming with JAVA A primer, 4th Edition, TATAMcGraw-Hill
4. Cay S Horstmann, Fary Cornell, Core Java 2, Volume – I, Sun MicrosystemsPress

Web links:

- https://docs.oracle.com/javase/tutorial/
- https://www.youtube.com/watch?v=naxnRkOfh2Q
- https://www.youtube.com/watch?v=J_d1fJy90GY&list=PLbRMhDVUMngcx5xHChJ-f7ofxZI4JzuQR

OBJECT ORIENTED MODELING DESIGN		Semester	V
Course Code	**BBCA504B**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P: S)	**4:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**50**	**Total Marks**	**100**
Credits	**04**	**Exam Hours**	**03**

Course objectives:

- Introduce object-oriented development concepts and UML fundamentals.
- Familiarize students with structural and behavioral modeling techniques.
- Develop skills in designing UML diagrams for software systems.
- Provide knowledge of advanced modeling concepts including states, processes, and interactions.
- Explain architectural modeling using components and deployment diagrams.

Module-1

Introduction: What Is Object-Oriented Development?, The Importance of Modeling, Introducing the UML

Basic Structural Model: Classes, Relationships, Diagrams, Class Diagrams.

Textbook 1: Chapter 1, 2, 4, 5, 8

Number of Hours: 10

Module-2

Basic Behavioural Modeling: Interactions, Use cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams.

Textbook 1: 15, 16, 17, 18, 19

Number of Hours: 10

Module-3

Advanced Structural Modeling: Advanced Classes, Interfaces, Types, and Roles, Packages, Instances, Object Diagrams

Textbook 1: Chapter 9, 11, 12, 13, 14

Number of Hours: 10

Module-4

Advanced Behavioral Modeling: Events and Signals, State Machines, Processes and Threads, Time and Space

Textbook 1: Chapter 20, 21, 22, 23

Number of Hours: 10

Module-5

Architectural Modeling: Components, Deployment, Collaborations, Component Diagrams.

Textbook 1: Chapter 25, 26, 27, 29

Number of Hours: 10

Teaching Methodology: Chalk and talk method / PowerPoint Presentation.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

CO 1. Explain object-oriented development concepts and UML basics.
CO 2. Develop use case, interaction, and activity diagrams for system modeling.
CO 3. Aadvanced structural modeling concepts using classes, interfaces, and packages.
CO 4. Analyze system behavior using state machines, events, and process models.
CO 5. Design architectural models using component and deployment diagrams.

Suggested Learning Resources:

Books

1. Grady Booch, James Rumbaugh, Ivar Jacobson – The Unified Modeling Language User Guide, Addison-Wesley, Volume 1, 2005.
2. Object-Oriented Analysis, Design and Implementation: An Integrated Approach (Third Edition) Brahma Dathan and Sarnath Ramnath Springer 2025 universities Press
3. Object-Oriented Analysis and Design with Applications, 3e January 2009 Grady Booch, Ivar Jacobson, and James Rumbaugh, Series Editors

Web links

- https://www.youtube.com/watch?v=ii9XAloOkpk
- http://www.digimat.in/nptel/courses/video/106105224/L30.html
- https://www.youtube.com/watch?v=VTbRfNqDb7Y

MOBILE APPLICATION DEVELOPMENT		SEMESTER	V
Course Code	**BBCA504C**	**CIE Marks**	**50**
Teaching Hours/Week (L: P: SDA)	**4:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**50**	**Total Marks**	**100**
Credits	**4**	**Exam Hours**	**3**

COURSE OBJECTIVES:

After the successful completion of the course, the student will be able to

- Introduce Android operating system architecture, versions, and development environment.
- Familiarize students with Activities, Fragments, and Intents in Android applications.
- Develop skills in designing Android user interfaces using layouts and views.
- Provide knowledge of UI components and event handling in Android applications.
- Enable students to build applications using menus, dialogs, and multimedia views.

MODULE-1

Android OS design and Features: What Is Android, Android Versions, Features of Android, Architecture of Android, Android Devices in the Market, The Android Market, The Android Developer Community, Obtaining the Required Tools, Creating Your First Android Application, Anatomy of an Android Application

Textbook 1: Chapter 1.1 to 1.4

Number of Hours: 10

MODULE-2

Activities, Fragments, And Intents: Applying Styles and Themes to an Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog, Displaying a More Sophisticated Progress Dialog, Resolving Intent Filter Collision, Returning Results from an Intent, Passing Data Using an Intent Object, Adding Fragments Dynamically, Life Cycle of a Fragment, Interactions between Fragments, Understanding the Intent Object, Using Intent Filters, Adding Categories, Displaying Notifications.

Textbook 1: Chapter 2.1 to 2.5

Number of Hours: 10

MODULE-3

Android User Interface: Views and ViewGroups, LinearLayout, AbsoluteLayout, TableLayout, RelativeLayout, FrameLayout, ScrollView, Anchoring Views, Resizing and Repositioning, Persisting State Information during Changes in Configuration, Detecting Orientation Changes, Controlling the Orientation of the Activity, Adding Action Items to the Action Bar, Customizing the Action Items and Application Icon, Creating the User Interface Programmatically, Overriding Methods Defined in an Activity, Registering Events for Views.

Textbook 1: Chapter 3.1 to 3.6

Number of Hours: 10

MODULE-4

Designing Your User Interface With Views: TextView View, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, ProgressBar View, AutoCompleteTextView View, TimePicker View, DatePicker View, ListView View, Using the Spinner View, Using a ListFragment, Using a DialogFragment, Using a PreferenceFragment

Textbook 1: Chapter 4.1 to 4.4

Number of Hours: 10

MODULE-5

Displaying Pictures And Menus With Views: Gallery and ImageView Views, mageSwitcher, GridView, Creating the Helper Methods, Options Menu, Context Menu, AnalogClock and DigitalClock Views, WebView.

Textbook 1: Chapter 5.1. to 5.3

Number of Hours: 10

Teaching Methodology: Chalk and talk method / PowerPoint Presentation

COURSE OUTCOMES:

CO 1. Explain Android architecture, features, and application structure.
CO 2. Apply Activities, Fragments, and Intents to develop interactive applications.
CO 3. Design user interfaces using Android layouts and UI controls.
CO 4. Implement various Android views and handle user interactions effectively.
CO 5. Develop Android applications using menus, dialogs, and advanced UI components.

Suggested Learning Resources:

Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), Volume 1, 2013
2. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed., 2011.

Web Links:

1. NPTEL: https://youtu.be/fis26HvvDII?si=nh66zZBX8OmKrDBA
2. https://www.tutorialspoint.com/android/android_studio.htm