



BCA (Bachelor of Computer Application)
Semester-VIII (Without Research)

Course Code	US08HMABCA01	Title of the Course	Basics of Machine Learning
Total Credits Of the Course	4	Hours per Week	4

Course Objectives:	1. To understand the fundamental concepts and terminology of Machine Learning, including types of learning such as supervised, unsupervised, and reinforcement learning. 2. To study various machine learning algorithms and models, including regression, classification, clustering, and decision trees. 3. To develop the ability to preprocess and analyze data using techniques such as data cleaning, feature selection, and normalization for effective machine learning model building. 4. To apply machine learning techniques to solve real-world problems using appropriate tools and programming languages. 5. To evaluate and interpret the performance of machine learning models using different evaluation metrics and validation techniques.
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Course Content		
Unit	Description	Weightage (%)
1.	Introduction to Machine Learning • What is Human Learning • What is Machine Learning • Human Learning vs Machine Learning • Types of Machine Learning • Applications of Machine Learning • Basic Types of Data in Machine Learning	25
2.	Data Preparation, Modelling, Training and Evaluation • Machine Learning Activities • Data Quality and Remediation • Data Pre-Processing Techniques • Selecting a Model • Training a Model • Model Representation and Interpretability • Evaluating the Performance of a Model	25





3.	Supervised Learning - Classification and Regression • Example of Supervised Learning • Classification Models • Steps in Classification Learning • Common Classification Algorithms(KNN, Decision Tree, Random Forest) • Regression Concepts • Common Regression Algorithms(Simple Linear, Multiple Linear Regression Algorithm)	25
4.	Unsupervised Learning • Introduction to Unsupervised Learning • Applications of Unsupervised Learning • Clustering Techniques • Finding Patterns using Association Rules	25

Teaching- Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination, Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to understand	
1.	Fundamental concepts of machine learning, types of learning, and their real-world applications.
2.	Analyze different data preparation techniques, including data preprocessing and feature engineering for machine learning models.
3.	Apply appropriate machine learning algorithms such as classification and regression techniques to solve computational problems.
4.	Evaluate the performance of machine learning models using suitable evaluation and model improvement techniques.
5.	Develop solutions for real-world problems using supervised and unsupervised learning techniques such as clustering and association rule mining.

Suggested References:	
Sr.No.	References
1.	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, Pearson Education, 2018.





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2.	Tom M Mitchell, Machine Learning, McGraw Hill, 1997.
3	Anuradha Srinivasaraghavan, Vincy Joseph, Machine Learning, Wiley India, 2019.

On-line resources to be used if available as reference material

On-line Resources

1. https://www.tutorialspoint.com/machine_learning/index.htm
2. https://www.w3schools.com/python/python_ml_getting_started.asp
3. <https://www.geeksforgeeks.org/machine-learning/machine-learning/>





BCA (Bachelor of Computer Application)
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Course Code	US08HMABCA02	Title of the Course	Cloud Computing
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To understand fundamental concepts and architecture of cloud computing. 2. To develop understanding of different cloud service models. 3. To familiarize students with the benefits, challenges, and real-world applications of cloud computing technologies. 4. To analyse risks, security issues, and management challenges associated with cloud environments. 5. To understand cloud security mechanisms including data protection, authentication, and access control.
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Course Content		
Unit	Description	Weightage (%)
1.	Introduction to Cloud Computing – Definition, terminology and characteristics of cloud computing – Benefits and challenges of cloud computing – Cloud Deployment Models (Public, Private, Hybrid) – Examples of Cloud Platforms (AWS, Google cloud, Azure) – Architecture of cloud computing – Applications of cloud computing	25%
2.	Cloud Service Models – Infrastructure as a Service (IaaS), Characteristics of IaaS, Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers – Platform as a Service (PaaS), Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers – Software as a Service (SaaS), Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.	25%





3.	Risks and Security in Cloud – Risk in cloud computing – Risk assessment and management – Loss of control – Risk of resource scarcity / poor provisioning – Risk of failure risk of malware and internet attacks – Risk of management of cloud resource risk of network outages – Risk of physical infrastructure legal risk – Risk with software and application licensing. – Application security in the cloud • Cloud application software lifecycle • Application security in an IaaS, PaaS and SaaS environment and its protection.	25%
4.	Cloud Security – Introduction – Infrastructure Security – Network level security – Host level security – Application-level security – Data security and Storage – Data privacy and security Issues – Jurisdictional issues raised by Data location – Authentication in cloud computing and access control.	25%

Teaching- Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination, Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	50%
2.	University Examination	50%





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Course Outcomes: Having completed this course, the learner will be able to

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| 1. | Explain the concepts and architecture of cloud computing. |
| 2. | Compare different cloud service models and providers. |
| 3. | Identify the benefits, challenges, and risks associated with cloud computing environments. |
| 4. | Analyse different security threats and risk management strategies in cloud computing systems. |

Suggested References:

Sr.No.	References
1.	A. Kannammal , Fundamentals of cloud computing, CENGAGE Learning, 2015.
2.	Rishabh Sharma, Cloud Computing Fundamentals, Industry Approach and Trends, Wiley Publication, 2017.
3.	Kailash Jayaswal, Jagannath Kallakurchi, Donald J Houde, Dr. Deven Shah, Cloud Computing, Black Book Dreamtech Publications, 2014.
4.	Rajkumar Buyya, James Broberg, Andrzej M Goscinski, Cloud Computing: Principles and Paradigms, Wiley Publication, 2011.
5.	Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2010.
6.	Judith Hurwitz, R Bloor, M. Kanfman, F. Halper, Cloud Computing for Dummies, First Edition, Wiley India Edition, 2010.
7.	Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly, SPD, 2011.
8.	Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed and Cloud Computing, Elsevier, 2012.

Other / On-line resources to be used if available as reference material

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| 1. https://www.geeksforgeeks.org/ |
| 2. https://www.tutorialspoint.com/ |
| 3. https://www.w3schools.com/ |





BCA (Bachelor of Computer Application)
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Course Code	US08HMABCA03	Title of the Course	Practical based on US08HMABCA01
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	1. To provide hands-on experience in understanding basic machine learning concepts using datasets. 2. To develop skills in data preprocessing techniques such as cleaning, transformation, and handling missing values. 3. To implement machine learning workflows including data preparation, model selection, training, and testing. 4. To explore and apply different machine learning models using suitable tools and environments. 5. To learn model evaluation techniques for assessing performance and accuracy of machine learning models.
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Course Content		
	Description	Weightage (%)
	Practical Based on Basics of Machine Learning.	100%

Teaching-Learning Methodology	Practical-based learning in small groups and Hands-on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination, Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to





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1.	Apply basic machine learning concepts using real-world datasets.
2.	Perform data preprocessing and improve data quality for model building.
3.	Implement simple machine learning models through a complete workflow.
4.	Select appropriate models and train them using given datasets.
5.	Evaluate and interpret the performance of machine learning models using standard metrics.





BCA (Bachelor of Computer Application)
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Course Code	US07HMIBCA04	Title of the Course	Data Analytics Using R Language
Total Credits Of the Course	2	Hours per Week	2

Course Objectives:	1. To understand the basic concepts of Data Analytics and its importance in decision making. 2. To familiarize students with the R programming environment and RStudio. 3. To develop understanding of data structures and data handling techniques in R. 4. To enable students to perform basic statistical analysis and data manipulation using R. 5. To provide practical knowledge of data visualization and simple analytical techniques.
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Course Content		
Unit	Description	Weightage (%)
1.	Introduction to Data Analytics and R Programming (Basic Fundamentals) • Introduction to Data Analytics • Need and Importance of Data Analytics • Types of Data Analytics: Descriptive, Predictive, Prescriptive • Overview, Features and Advantages of R Programming Language • Introduction to RStudio • Basic Syntax of R: Variables, Constants, Data Types, Operators	50
2.	Data Structures and Basic Data Handling in R • Introduction to Data Structures in R: vectors, lists, matrices, arrays and data frames • Importing Data from External Files (CSV, Excel) • Exporting Data from R • Basic Data Manipulation • Handling Missing Values • Basic Statistical Functions (Mean, Median, Standard Deviation, Summary)	50

Teaching- Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination, Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the fundamental concepts and applications of Data Analytics.
2.	Use R programming language and RStudio environment for basic data analysis tasks.
3.	Work with different data structures such as vectors, lists, matrices, arrays, and data frames.
4.	Import, manipulate, and analyze datasets using basic statistical functions in R.

Suggested References:	
Sr.No.	References
1.	Seema Acharya: Data Analytics Using R: 1st Edition, McGraw Hill Education Publication, 2018.
2.	Jeeva Jose: Beginner's Guide for Data Analysis Using R Programming: 1st Edition, Khanna Book Publishing Publication, 2018.
3.	Bharti Motwani: Data Analytics with R: 1st Edition, Wiley India Publication, 2016.

On-line resources to be used if available as reference material	
On-line Resources	
1.	https://www.r-project.org/
2.	https://www.tutorialspoint.com/r/index.htm
3.	https://www.geeksforgeeks.org/r-programming-language-introduction/





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Course Code	US08HMIBCA05	Title of the Course	Practical based on US08HMIBCA04
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	To introduce the fundamental concepts of Data Analytics and provide basic programming knowledge using R and RStudio for data handling, analysis, and simple statistical operations.
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Course Content		
	Description	Weightage (%)
	Practical based on Data Analytics using R	100%

Teaching-Learning Methodology	Practical-based learning in small groups and Hands-on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination, Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Use R and RStudio to write simple programs for data analysis.
2.	Work with different data structures such as vectors, lists, matrices, arrays, and data frames.
3.	Import, export, and manipulate datasets and perform basic statistical analysis using R functions.
4.	Use R and RStudio to write simple programs for data analysis.





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Course Code	US08HSEBCA06	Title of the Course	On Job Training
Total Credits of the Course	6	Hours per Week	12

Course Objectives:	To apply conceptual knowledge for solving real-world problems.
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Course Content		
	Description	Weightage (%)
	practical experience in an industry by applying theoretical knowledge to real-world tasks and projects.	100

Teaching-Learning Methodology	Project-based learning and hands-on training through required ICT tools.
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Evaluation Pattern		
Sr.No.	Details of the Evaluation	Weightage (%)
1.	Internal Project Examination, Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Technical proficiency (e.g., coding, networking), Problem-solving, Teamwork, Professional ethics etc.

