



B.Sc. (CA&IT) (Bachelor of Science in Computer Applications & Information Technology)
Semester-VIII (Without Research)

Course Code	US08HMACIT01	Title of the Course	Introduction to 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	
1.	Understand 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/>





B.Sc. (CA&IT) (Bachelor of Science in Computer Applications & Information Technology)
Semester-VIII (Without Research)

Course Code	US08HMACIT02	Title of the Course	Basics of 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%

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

1. <https://www.geeksforgeeks.org/>

2. <https://www.tutorialspoint.com/>

3. <https://www.w3schools.com/>





B.Sc. (CA&IT) (Bachelor of Science in Computer Applications & Information Technology)
Semester-VIII (Without Research)

Course Code	US08HMACIT03	Title of the Course	Practical based on US08HMACIT01
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	
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.

B.Sc. (CA&IT) (Bachelor of Science in Computer Applications & Information Technology)
Semester-VIII (Without Research)

Course Code	US08HMIT04	Title of the Course	Fundamentals of IoT
Total Credits Of the Course	2	Hours per Week	2

Course Objectives:	1. To introduce the fundamental concepts of Internet of Things (IoT) and its application areas in modern technology. 2. To develop understanding of IoT architecture, stack layers, and operational levels used in IoT systems. 3. To explain the concept of “Things” in IoT and how devices communicate within IoT networks. 4. To familiarize students with different sensors used in IoT systems such as light, ultrasonic, gas, temperature, humidity, PIR, GPS, heartbeat, and pH sensors. 5. To enable students to understand interfacing techniques between sensors and microcontrollers using Arduino IDE.
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Course Content		
Unit	Description	Weightage (%)
1.	Basics of IoT • Application Areas of IoT • Characteristics of IoT • Concept of “Things” in IoT • IoT Stack and its Layers • IoT Challenges • IoT Levels • IoT Architecture	50





2.	IoT Components and Interfacing • Introduction to Sensors • Types of Sensors in IoT: Light sensor, Ultrasonic sensor, Gas sensor, Temperature and Humidity sensor, PIR motion sensor, GPS sensor, heartbeat sensor, Ph Sensor • Basics of Microcontroller • Arduino Overview: Architecture, Components, Arduino IDE, Program Structure (setup() and loop() functions)	50
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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.	explain the fundamental concepts, characteristics, and application areas of IoT.
2.	describe IoT architecture, IoT stack layers, and different IoT operational levels
3.	identify and differentiate various sensors used in IoT applications
4.	understand the working principles of microcontrollers and Arduino architecture.
5.	develop basic IoT programs using Arduino IDE and implement simple sensor interfacing.

Suggested References:	
Sr.No.	References
1.	Arshdeep Bahga, Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press, Hyderabad, 2015.
2.	Raj Kamal, Internet of Things: Architecture and Design Principles, McGraw Hill Education (India) Pvt. Ltd., 2017.
3.	Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley Publications, 2012
4.	Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, John Wiley & Sons, 2015
5.	Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6, Wiley Publications, 2013





6.	Sudip Misra, Anandarup Mukherjee, Arijit Roy, <i>Introduction to Internet of Things: A Practical Approach</i> , Cambridge University Press India, 2021.
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On-line resources to be used if available as reference material

On-line Resources

1. <https://www.geeksforgeeks.org/internet-of-things-iot/>
2. https://www.tutorialspoint.com/internet_of_things/index.htm
3. <https://www.ibm.com/topics/internet-of-things>





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Course Code	US08HMICIT05	Title of the Course	Practical based on US08HMICIT04
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	• To develop practical understanding of Internet of Things (IoT) concepts, architecture, and components. • To provide hands-on experience with sensors and microcontrollers used in IoT systems. • To implement sensor interfacing and data acquisition using Arduino and related development tools. • To design simple IoT-based applications for monitoring and automation using different sensors.
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Course Content		
	Description	Weightage (%)
	Practical based on Programming Fundamentals of IoT.	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.	explain the working of IoT components such as sensors, microcontrollers, and





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	communication modules.
2.	interface different sensors with Arduino and acquire data using appropriate programming techniques.
3.	develop simple IoT-based applications for monitoring and automation.





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Course Code	US08HSECIT06	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 solve 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.

