

FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

Additional / Optional paper for specialization in Data Science

for

**Bachelor of Science (Information Technology)/
Bachelor of Computer Applications**

(Semester V-VI)

(Under Credit Based Continuous Evaluation Grading System)

(12+3 System of Education)

Session: 2025-26



**The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Information Technology)/ Bachelor of Computer Applications

Session 2025-26

Additional / Optional paper for Specialization in Data Science

Bachelor of Science (Information Technology)/ Bachelor of Computer Applications Semester – V										
Course Code	Course Name	Cour se Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
BITL-5118/ BCAL-5118	* Data Mining and Data Warehousing	O	4-0-0	4-0-0	4	100	80	-	20	3
	Total				4	100				

Bachelor of Science (Information Technology)/ Bachelor of Computer Applications Semester – VI										
Course Code	Course Name	Course Type	Hours per week	Credit		Marks			Examination Time (in Hours)	
			L-T-P	L-T-P	Total	Total	Ext.			CA
							L	P		
BITM-6116/BCAM-6115	* Data Mining Tool	O	2-0-4	2-0-2	4	100	50	30	20	3+3
	Total				4	100				

Note:

O - Optional

*One additional/optional paper will be studied by the candidate if she opts for Specialization in Data Science

Bachelor of Science (Information Technology) / Bachelor of Computer Applications

Semester V

(Session 2025-26)

COURSE CODE: BITL-5118/ BCAL-5118

DATA MINING AND DATA WAREHOUSING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend data mining and knowledge discovery, process and applications of data mining.

CO2: Identify various data mining techniques along with classification of data.

CO3: Study and analyze architecture of data warehouse.

CO4: Comprehend various types of data warehouse, tools and technologies used.

Bachelor of Science (Information Technology) / Bachelor of Computer Applications
Semester V
(Session 2025-26)

COURSE CODE: BITL-5118/ BCAL-5118
DATA MINING AND DATA WAREHOUSING

L-T-P: 4-0-0

Credit: 4

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 80

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT I

Introduction to Data Mining: Introduction to Data Mining Systems, Knowledge Discovery, Data Mining Process, Applications, Web Search Engines, Trends and Challenges in Data Mining.

UNIT II

Data Mining Techniques: Association, classification, clustering, prediction, sequential patterns and decision tree.

Classification: Distance based algorithms, K-nearest neighbors, Euclidean distance, city block distance, tangent distance, Clustering Algorithms, Cluster Analysis, Partitioning methods, Hierarchical methods, density based methods, Grid based methods

UNIT III

Data Warehousing: Introduction, Evolution, Concepts, Benefits, Problems, Architecture, OLAP.

UNIT IV

Types of Data Warehouses: Host based, single stage, LAN Based, multistage, stationary distributed and virtual data warehouses, Data Warehouse tools and technologies

References / Textbooks:

1. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, 13th Reprint 2008.

2. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, 2012
3. Parteek Bhatia, "Data Mining and Data Warehousing: Principles and Practical Techniques", Cambridge University Press (2019).
4. M. SudheepElayidom, "Data Mining and Warehousing", 1st Edition, CL India
5. KhushbooSaxena, Sandeep, Dr. Akash Saxena, "Data Mining and Warehousing", BPB Publications (2014)

Bachelor of Science (Information Technology) / Bachelor of Computer Applications

Semester VI

(Session 2025-26)

COURSE CODE: BITM-6116/ BCAM-6115

DATA MINING TOOL

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the concept of data set and confusion matrix and implement it in WEKA tool.

CO2: Describe data pre-processing tasks and association rule mining on data sets.

CO3: Apply learned techniques to perform classification on data sets.

CO4: Apply learnt techniques to perform clustering of data sets.

Bachelor of Science (Information Technology) / Bachelor of Computer Applications

Semester VI

(Session 2025-26)

COURSE CODE: BITM-6116/ BCAM-6115

DATA MINING TOOL

L-T-P: 2-0-2

Credit: 4

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 50

Practical: 30

CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (10 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Beginning with Weka: About Weka, Installing Weka, Explore machine learning tool “Weka”

A. Explore Weka Data Mining/Machine Learning Toolkit Downloading and/or installation of WEKA data mining toolkit, Understanding the features of WEKA toolkit such as Explorer, Preparing the dataset, understanding the ARFF format, working with a Data set in Weka, Plot Histogram, Learn confusion Matrix, Precision and recall in machine learning

UNIT II

Perform data processing tasks and demonstrate performing association rule mining on data sets:

Explore various options available in Weka for preprocessing data and supply unsupervised filters like discretization, Resample filter, Load various data sets into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.

UNIT III

Demonstrate performing classification on data sets: Load each data set into Weka and run 1d3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic. Load each data set into Weka and perform Naïve-bayes classification and K-nearest Neighbor classification. Interpret the results obtained. Plot RoC Curves.

UNIT IV

Demonstrate performing clustering of data sets: Load each data set into Weka and run simple K-means clustering algorithm with different values of k (number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights. Explore other clustering techniques available in Weka. Explore visualization features of Weka to visualize the clusters.

References / Textbooks:

1. Ian H. EibeFrank , Mark A. Hall, Christopher J. Pal, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann Series in Data Management Systems, Third Edition.
2. Jiawei Han and MichelineKamber, “Data Mining Concepts and Techniques”, 3rd Edition, Elsevier, 2012
3. Parteek Bhatia, “Data Mining and Data Warehousing: Principles and Practical Techniques”, Cambridge University Press, 2019.
4. BostjanKaluza, Instant Weka How-to, PACKT Publishing , First Edition- 2013.