



# UNIVERSITY OF JAMMU

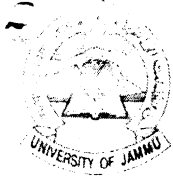
(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)  
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: [academicsectionju14@gmail.com](mailto:academicsectionju14@gmail.com)

## CORRIGENDUM

		Please Read		Instead of	
	Semester	Course Code/Title		Course Code/Title	
BCA (Web Technology)	Semester-I	UMJCST101	Web Designing	UMJBCT101	Web Designing
		UMICST102	Computer Fundamentals	UMIBCT102	Computer Fundamentals
		UMDCST103	World Wide Web and Internet	UMDBCT103	World Wide Web and Internet
		USECST104	PC Software: Installation and Troubleshooting	USEBCT104	PC Software: Installation and Troubleshooting
	Semester-II	UMJCST201	Scripting Language	UMJBCT201	Scripting Language
		UMICST202	Web Programming using PHP	UMIBCT202	Web Programming using PHP
		UMDCST203	Introduction to Web Designing	UMDBCT203	Introduction to Web Designing
		USECST204	Cyber Security	USEBCT204	Cyber Security
BCA (Data Science)	Semester-I	UMJCST131	Problem Solving using C	UMJBCT131	Problem Solving using C
		UMICST132	Data Science Basics	UMIBCT132	Data Science Basics
		UMDCST133	Data Mining and Data Warehousing	UMDBCT133	Data Mining and Data Warehousing
		USECST104	PC Software: Installation and Troubleshooting	USEBCT104	PC Software: Installation and Troubleshooting
	Semester-II	UMJCST231	Introduction to Data Science	UMJBCT231	Introduction to Data Science
		UMICST232	Python Programming	UMIBCT232	Python Programming
		UMDCST233	Introduction to Machine Learning	UMDBCT233	Introduction to Machine Learning
		USECST204	Cyber Security	USEBCT204	Cyber Security
BCA (Software Development)	Semester-I	UMJCST161	Programming Paradigms & C Language	UMJBCT161	Programming Paradigms & C Language
		UMICST162	Computer Fundamentals and PC Software	UMIBCT162	Computer Fundamentals and PC Software
		UMDCST163	Computer Fundamentals	UMDBCT163	Computer Fundamentals
		USECST104	PC Software: Installation and Troubleshooting	USEBCT104	PC Software: Installation and Troubleshooting



# UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)  
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: [academicsectionju14@gmail.com](mailto:academicsectionju14@gmail.com)

	Semester-II	UMJCST261 Data and File Structures using C Language	UMJBCT261 Data and File Structures using C Language
		UMICST262 Python Programming	UMIBCT262 Python Programming
		UMDCST263 C-Programming	UMDBCT263 C-Programming
		USECST204 Cyber Security	USEBCT204 Cyber Security

as already notified vide notification No. F.Acd/II/22/9306-9345 dated 07.11.2022 in the Syllabi and Courses of Studies of semester Ist and IInd for **Four Year Under Graduate Programme of Bachelor of Computer Applications (FYUGP-BCA)** under the Choice Based Credit System as per **NEP-2020 (as given in the Annexure)**

Sd/-  
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/22/10245-10255'

Dated: 07-12-2022

Copy for information and necessary action to:

1. Dean, Faculty of Mathematical Science
2. HOD/Convener, Board of Studies in Computer Science & IT
3. All members of the Board of Studies
4. C.A to the Controller of Examinations
5. Director, Computer Centre, University of Jammu
6. Asst. Registrar (Conf. /Exams. UG)
7. Incharge, University Website for necessary action please.

Deputy Registrar (Academic)

*[Signature]*  
07/11/22  
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07/12/22

**Bachelor of Computer Applications  
(BCA)**

**SYLLABUS**

*Four Year Undergraduate Programme*

*As per NEP 2020 guidelines*

*Under Choice based Credit System*

**FOR THE STUDENTS TO BE ADMITTED IN THE SESSIONS  
2022-23, 2023-24, 2024-25**



## Course Details for Four Year UG Programme

S. NO.	COURSES	DISCIPLINES
1	Computer Applications (CA)- Arts & Science	Natural Science and Arts & Humanities
2	Information Technology (IT)- Arts & Science	Natural Science and Arts & Humanities
3	<b>Bachelor of Computer Applications (BCA)</b>	Computer Applications (for BCA degree)
	BCA (Web Technology)	
	BCA (Data Science)	
	BCA (Software Development)	



# **Bachelor of Computer Applications (BCA)**

# **DATA SCIENCE**

# **SCHEME**

***Four Year Undergraduate Programme***

***As per NEP 2020 guidelines***

***Under Choice based Credit System***

**FOR THE STUDENTS TO BE ADMITTED IN THE SESSIONS 2022-23,  
2023-24, 2024-25**



**COURSES OF STUDY****Semester-I**

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical/Tutorial		
					Mid Semester	End Exam	Assessment	Exam	
1	Major	UMJCST131	Problem Solving using C	4(3L+1P)	15	60	10	15	100
2	Minor	UMICST132	Data Science Basics	4(3L+1P)	15	60	10	15	100
3	MD	UMDCST133	Data Mining and Data Warehousing	3	15	60	NA	NA	75
4	SEC	USECST104	PC Software: Installation and Troubleshooting	2	10	40	NA	NA	50

**Semester-II**

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical/Tutorial		
					Mid Semester	End Exam	Assessment	Exam	
1	Major	UMJCST231	Introduction to Data Science	4(3L+1P)	15	60	10	15	100
2	Minor	UMICST232	Python Programming	4(3L+1P)	15	60	10	15	100
3	MD	UMDCST233	Introduction to Machine Learning	3	15	60	NA	NA	75
4	SEC	USECST204	Cyber Security	2	10	40	NA	NA	50

**BCA (Data Science) - FIRST SEMESTER**

Course: Major  
Course Credits: (L-P-T)  
(3-1-0)  
Total marks: 100

Course Title: Problem Solving using C  
Course Code: UMJCST131  
Mid Semester assessment: 15 Marks of 1.5 hours duration  
End Semester assessment: 60 Marks of 3.0 hours duration  
Practical: 25 Marks

***For examinations to be held in Dec 2022, 2023 and 2024***

**Course objectives & learning outcomes:**

1. To learn the fundamentals of programming language.
2. To understand the concept of different control structures.
3. To learn about different data structures
4. To understand the concept of procedural programming.

**UNIT - I**

Algorithm, Flowcharts, Flowchart Symbols, Flowchart Rules, Assemblers, Compilers and Interpreters, Pseudo Code, Introduction to C programming, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Format of C program, Arithmetic, Relational & Logical Operators, Assignment Operators, Increment & Decrement Operators, Operator Precedence & Associativity. 15 Hours

**UNIT - II**

Formatted Input, Formatted Output, escape sequences, Conditional Statements: if Statement, if..... else Statement, Nested if....else Statements, Switch Statement, conditional Operator, Goto Statement, loops- for loop, while loop, do-while loop, break and continue statement. 15 Hours

**UNIT - III**

Qualifiers, Storage classes, Pointers definition, Declaring Pointer Variables, using pointer variable, Arrays: One, Two and Multi Dimension Arrays, Initialization of one and two dimensional Arrays, Declaring and Initializing String Variables, String Handling Functions. 15 Hours

**UNIT - IV**

Preprocessor directives, Function Definition, Function Calls (call by value & call by address method) Returning Value, Types of Functions, Recursion, Passing Arrays to Functions, Macros, Defining Structure, Declaring and Accessing Structure Variables, Structures and Unions, Basics of File Handling and operations like open, close, read, write etc. Enumerations. 15 Hours

**Suggested readings/ references:**

1. E. Balaguruswami, Programming in C, PHI
2. Gottfried. B, Theory and problems of Programming with C Language, Tata Mc Graw Hill.
3. Kenneth. A, C Problem Solving and Programming, PHI.
4. Dan Gookin, C Programming, Wiley Dreamtech.
5. Y. P. Kanetkar, Understanding Pointers in C, BPB Publications.
6. Shubhnandan S. Jamwal, Programming in C, Pearson Publications.
7. H.M. Deitel and P.J. Deitel, C How to Program, PHI.



**BCA (Data Science) - FIRST SEMESTER**

Course: Major  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Problem Solving using C  
 Course Code: UMJCST131  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in Dec 2022, 2023 and 2024***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS -**

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

**Section B** shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

**Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**

**Practical/ tutorial Evaluation**

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

**Final Examination**

15 Marks

**Pattern for external practical examination**

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

**Pattern for external tutorial examination**

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks



**BCA (Data Science) – FIRST SEMESTER**

Course: Minor  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Data Science Basics  
 Course Code: UMICST132  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in Dec 2022, 2023 and 2024***

**Course objectives & learning outcomes:**

1. Introduction to basics of data science.
2. Understanding the concepts of data mining.
3. To learn about functioning of machine learning techniques.
4. Understanding the concepts of data visualizations.

**UNIT-I**

Introduction to Data Science: Definition, benefits and uses of data science and big data.

Facets of Data: Structured data, unstructured data, natural language, machine generated data, network data, audio, images and video streaming data.

Data science process: overview of data science process, defining the goal, retrieving data, data preparation, data exploration, build the models. 15 Hours

**UNIT-II**

DATA: Definition, characteristics of data, classification of digital data.

The Data Science Fundamentals: Distributed file system, data integration framework, machine learning framework, system deployment, security.

Data Mining: definition, languages for data science, collection data-hunting, logging, scraping, cleaning. 15 Hours

**UNIT-III**

Machine Learning: Definition, Applications of machine learning in data science, Types of Machine Learning- supervised learning, semisupervised learning, un-supervised learning, Linear regression, Decision tree classifier, Bayes - Naive bayes 15 Hours

**UNIT-IV**

Data Visualization: Definition, importance of data visualization in data science, Exploratory Data analysis- confronting new dataset, visualization tools, developing a visualization aesthetic- maximizing data link ratio

Chart Types: Tabular data, dot and line plots, scatter plots, bar plots and pie charts. 15 Hours

**Suggested readings/ references:**

1. Davy Cielen , Arno D.B.Meysman and Mohamed Ali, "Introducing Data Science", Published by Manning
2. Steven S.Skienna, "The Data Science Design Manual", Published by Springer Nature.
3. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk from the Frontline", O'Reilly.
4. Jure Leskovek, Anand Rajaraman and Jeffrey D.Ullman, "Mining of Massive Datasets", Cambridge University Press.



**BCA (Data Science) – FIRST SEMESTER**

Course: Minor  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Data Science Basics  
 Course Code: UMICST132  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in Dec 2022, 2023 and 2024***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS –**

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

**Section B** shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

**Note:** -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

**Practical/ tutorial Evaluation**

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

**Final Examination**

15 Marks

**Pattern for external practical examination**

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

**Pattern for external tutorial examination**

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks

## BCA (Data Science) – FIRST SEMESTER

Course: Multidisciplinary Foundation Courses (MD)  
 Course Credits: (L-P-T)  
 (3-0-0)  
 Total marks: 75

Course Title: Data Mining and Data Warehousing  
 Course Code: UMDCST133  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration

***For examinations to be held in Dec 2022, 2023, and 2024***

### Course objectives & learning outcomes:

1. Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
2. Extract interesting patterns from large amounts of data.
3. Discover the role played by data mining in various fields.
4. Choose and employ suitable data mining algorithms to build analytical applications

### UNIT-I

Data Mining: Data and Types of Data, Data Mining Functionalities. Interestingness, Patterns– Classification of Data Mining systems, Data mining Task primitives, Major issues in Data Mining–Data Preprocessing.

10 Hours

### UNIT-II

Data Warehouse and OLAP Technology for Data Mining: Introduction to Data Warehouses, Differences between Operational Database Systems and Data Warehouses, Multidimensional Data Model, Three-tier Data Warehouse Architecture, Schemas -Stars, Snowflakes and Fact Constellations.

10Hours

### UNIT-III

Classification: Classification and Prediction, Basic concepts, Decision tree induction, Bayesian classification, Rule-based classification, Lazy learner.

10Hours

### UNIT-IV

Clustering and Applications: Cluster analysis, Types of Data in Cluster Analysis, Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Outlier Analysis.

15 Hours

### Suggested readings/ references:

1. Jiawei Han & Micheline Kamber, "Data Mining – Concepts and Techniques – 3<sup>rd</sup> Edition", Elsevier.
2. Margaret H Dunham, "Data Mining Introductory and Advanced topics" PEA.
3. Ian H. Witten and Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann.



**BCA (Data Science) – FIRST SEMESTER**

Course:	Multidisciplinary Foundation Courses (MD)	Course Title: Data Mining and Data Warehousing
Course Credits:	(L-P-T) (3-0-0)	Course Code: UMD CST133
Total marks:	75	Mid Semester assessment: 15 Marks of 1.5 hours duration End Semester assessment: 60 Marks of 3.0 hours duration

***For examinations to be held in Dec 2022, 2023, and 2024***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS -**

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

**Section B** shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

**Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**



## BCA (Data Science) – FIRST SEMESTER

Course: Skill Enhancement Course (SEC)  
 Course Credits: (L-P-T)  
 (2-0-0)  
 Total marks: 50

Course Title: PC Software: Installation and Troubleshooting  
 Course Code: USECST104  
 Mid Semester assessment: 10 Marks of 1.5 hours duration  
 End Semester assessment: 40 Marks of 2.5 hours duration

***For examinations to be held in Dec 2022, 2023, and 2024***

### Course objectives & learning outcomes:

1. To provide knowledge about the PC Hardware.
2. To brief about different utilities and PC settings.
3. To develop the ability to configure, setup and troubleshoot PC.

### UNIT -I

Introduction to PC Hardware: Study of basic I/O systems, Types of Memories- Static RAM and Dynamic RAM, ROM, PROM, EPROM, EEPROM, External Storage Devices, CPU (Central Processing Unit)- ALU and control, Motherboard and Processor :Types of Processor, System performance Motoring. 10 Hours

### UNIT -II

BIOS Configuration: Study of BIOS Set-up- Advance set-up, Boot configuration, Boot Menu, Installation of Operating System (Windows), Control panel, Installation and uninstallation of application software, Setting System Date and Time, Hard Disk: Formatting of Hard disk, Partitioning of Hard disk in different logical drives, Defragmenting Hard disk using defrag, Scan Disk for checking disk space, Disk clean up, Scan disk, Installation of Device Drivers: Different types of Motherboard drivers: Network, Audio, and Graphics, Modem. Display Settings: Resolution, Themes, multiple displays, Projector Set up. 10 Hours

### UNIT-III

Configuration of External devices: Physical set-up of Printers- Performing test print out, Printing of document etc, Scanner set-up, Webcam, Bluetooth device, Memory card reader, Diagnostic and troubleshooting of PC: POST (Power on Self Test), Maintenance of PC, Error messages, Task Manager. Concept of compression Compression Utilities: WinZip, PKZIP, files recovery, Antivirus, CD/DVD Writing Software, Concept of Virtual drives and Image files (ISO). 10 Hours

### Suggested readings/ references:

1. Mark Minasi, "The complete PC Upgrade & Maintenance Guide", BPB Publications.
2. D Balasubramanian, "Computer Installation and Servicing", Tata McGraw Hill Education.
3. Robert C. Brenner, "Trouble Shooting and Repair Guide", BPB Publications.
4. Scott Mueller, "Upgrading and Repairing PC's", PHI Publications, Fourth Edition.
5. Adane Nega Tarekegn, "A Simple Guide to Computer Maintenance and Troubleshooting", LAP LAMBERT Academic Publishing.
6. James Karney, "Upgrade & Maintain Your PC", M & T Books; 2nd edition.



**BCA (Data Science) – FIRST SEMESTER**

Course: Skill Enhancement Course (SEC)  
Course Credits: (L-P-T)  
(2-0-0)  
Total marks: 50

Course Title: PC Software: Installation and Troubleshooting  
Course Code: USECST104  
Mid Semester assessment: 10 Marks of 1.5 hours duration  
End Semester assessment: 40 Marks of 2.5 hours duration

***For examinations to be held in Dec 2022, 2023, and 2024***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS -**

The question paper will be divided into the following two sections. No question shall be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions (at least one from each unit). The students are required to attempt all questions. Each question shall be of 2½ Marks.

(4 x 2½ = 10 marks)

**Section B** shall consist Six (6) long answer questions (two from each unit). The students are required to attempt three questions. Each question shall be of 10 Marks.

(3 x 10 = 30 marks)

**Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**



**BCA (Data Science) - SECOND SEMESTER**

Course: Major  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Introduction to Data Science  
 Course Code: UMJCST231  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in May 2023, 2024 and 2025***

**Course objectives & learning outcomes:**

1. Introduction to basics of data science.
2. Understanding the concepts of data mining.
3. To learn about functioning of machine learning techniques.
4. Understanding the concepts of data visualizations.

**UNIT-I**

Introduction to Data Science: Definition, benefits and uses of data science and big data.

Facets of Data: Structured data, unstructured data, natural language, machine generated data, network data, audio, images and video streaming data.

Data science process: overview of data science process, defining the goal, Retrieving data, data preparation, data exploration, build the models, cleaning and transforming data, presentation and automation.

15 Hours

**UNIT-II**

DATA: Definition, characteristics of data, classification of digital data.

The Data Science Fundamentals: Distributed file system, data integration framework, machine learning framework, system deployment, security.

Data Mining: definition, languages for data science, collection data-hunting, logging ,scraping, cleaning data-errors. artifacts, data compatibility, dealing with missing values, outlier detection.

15 Hours

**UNIT-III**

Machine Learning: Definition, Applications of machine learning in data science, Types of Machine Learning-supervised learning, semi supervised learning, un-supervised learning, Linear regression, Decision tree classifier, Bayes - Naive bayes

15 Hours

**UNIT-IV**

Data Visualization: Definition, importance of data visualization in data science, Exploratory Data analysis-confronting new dataset, visualization tools, developing a visualization aesthetic-maximizing data link ratio, proper scaling and labeling, effective use of color and shading, the power of repetition.

Chart Types: Tabular data, dot and line plots, scatter plots, bar plots and pie charts.

15 Hours

**Suggested readings/ references:**

1. Davy Cielen , Arno D.B.Meysman and Mohamed Ali, "Introducing Data Science", Published by Manning
2. Steven S. Skiena, "The Data Science Design Manual",Published by Springer Nature.
3. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk from the Frontline", O'Reilly.
4. Jure Leskovek, Anand Rajaraman and Jeffrey D.Ullman, "Mining of Massive Datasets", Cambridge University Press.



**BCA (Data Science) - SECOND SEMESTER**

Course: Major  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Introduction to Data Science  
 Course Code: UMJCST231  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in May 2023, 2024 and 2025***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS -**

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

**Section B** shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

**Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**

**Practical/ tutorial Evaluation**

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

**Final Examination**

15 Marks

**Pattern for external practical examination**

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

**Pattern for external tutorial examination**

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks



**BCA (Data Science)–SECOND SEMESTER**

Course: Minor  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Python Programming  
 Course Code: UMICST232  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in May 2023, 2024 and 2025***

**Course objectives & learning outcomes:**

1. Provide in-depth knowledge of developing and debugging Python Programs.
2. Illustrate and manipulate core data structures like Lists, Dictionaries, Tuples, and Strings.
3. Understand the concept of files and exception handling

**UNIT-I**

Introduction: Basic concepts: Functional Programming, OOPS and Data Structures Getting Started: Running Code in the Interactive Shell, Input, Processing and Output, Editing, Saving and Running a Script, Working of Python. Variables, Expressions and Statements: Values and Data Types, Variables, Keywords, String Literals, Escape Sequences, Operators and Operands, Expressions and Statements, Interactive mode and Script mode, Order of Operations, Comments.

15 Hours

**UNIT-II**

Conditional Statements and Loops: Modulus Operator, Boolean Expressions, Logical Operators, Conditional Execution "if statement", Alternative Execution "else clause", Chained Conditionals "elif clause", Nested Conditionals, while statement, For loop, Break and Continue Statement.

15 Hours

**UNIT-III**

Functions Function Calls, Type Conversion Functions, Math Functions, Composition, Adding new functions, Importing modules with "from", Recursion, Stack Diagram for Recursive Functions. String Functions-Traversal, Comparison, Searching, Counting, Pre-defined String Functions.

15 Hours

**UNIT-IV**

Lists, Dictionaries and Tuples: Lists- List as a Sequence, Traversing a list, List Operations, List Slices, List Methods, Map, filter and Reduce, Deleting Elements, Lists and Strings. Dictionaries-Dictionary as a set of counters, Looping and Dictionaries, Reverse Look Up, Dictionaries and Lists. Tuples-Tuple Assignment, Tuples as return values, Variable Length argument tuples, Lists and Tuples, Dictionaries and Tuples.

15 Hours

**Suggested readings/ references:**

1. Allen B. Downey, "Think Python", O'Reilly, Sebastopol, California.
2. Aditya Kanetkar and Yashavant Kanetkar, "Let us Python", BPB publications.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Franklin, Beedle & Associates Inc.
4. Martin C. Brown., "Python: The Complete Reference", McGraw Hill.
5. Harsh Bhasin, "Python for beginners", New age international ltd



**BCA (Data Science)–SECOND SEMESTER**

Course: Minor  
 Course Credits: (L-P-T)  
 (3-1-0)  
 Total marks: 100

Course Title: Python Programming  
 Course Code: UMICST232  
 Mid Semester assessment: 15 Marks of 1.5 hours duration  
 End Semester assessment: 60 Marks of 3.0 hours duration  
 Practical: 25 Marks

***For examinations to be held in May 2023, 2024 and 2025***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS –**

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

**Section B** shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

**Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**

**Practical/ tutorial Evaluation**

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

**Final Examination**

15 Marks

**Pattern for external practical examination**

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

**Pattern for external tutorial examination**

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks

**BCA (Data Science) - SECOND SEMESTER**

Course: **Multidisciplinary Foundation Courses (MD)**  
Course Credits: **(L-P-T)**  
**(3-0-0)**  
Total marks: **75**

Course Title: Introduction to Machine Learning  
Course Code: UMDCST233  
Mid Semester assessment: 15 Marks of 1.5 hours duration  
End Semester assessment: 60 Marks of 3.0 hours duration

***For examinations to be held in May 2023, 2024 and 2025***

**Course objectives & learning outcomes:**

1. To understand the concepts of Machine Learning.
2. Understanding the real world applications of classification.
3. To understand complexity of Machine Learning algorithms and their limitations.
4. Analyzing various machine learning algorithms.

**UNIT-I**

Introduction, Types of machine learning: supervised, unsupervised, semi-supervised and reinforcement learning, Machine learning model, Steps in the design of learning system, Challenges in machine learning, Applications of machine learning.

10 HOURS

**UNIT-II**

Labelled data, Introduction to classification and its types, Statistical summary of data, Data pre-processing, Normalization, Training and Testing, Cross Validation, Steps in building a classifier in python. Classification algorithms: K-nearest neighbor, Support vector machine, Decision tree, etc., Classification evaluation metrics

10HOURS

**UNIT-III**

Feature Selection: Introduction and its importance, Feature selection techniques, Principal component analysis. Unlabeled data, Introduction to clustering and its applications, Cluster formation methods, K-means algorithm, Hierarchical clustering, etc.

10HOURS

**UNIT-IV**

Overfitting, Underfitting, Bias and Variance, Imbalanced dataset and its handling, Hyper-parameter tuning, Ensemble methods: Bagging and Boosting, Ensemble voting.

15 HOURS

**Suggested readings/ references:**

1. Manohar Swamynathan "Mastering Machine Learning with Python in Six Steps", Apress.
2. Machine Learning, "A Probabilistic Perspective", MIT Press, 2012 by Kevin Murphy.
3. Shai Shalev-Shwartz, Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms".
4. Mark Summerfield, "Programming in python 3: A Complete Introduction to Python Programming".
5. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", 2009



**BCA (Data Science) - SECOND SEMESTER**

Course: Multidisciplinary Foundation Courses (MD)  
Course Credits: (L-P-T)  
(3-0-0)  
Total marks: 75

Course Title: Introduction to Machine Learning  
Course Code: UMDCST233  
Mid Semester assessment: 15 Marks of 1.5 hours duration  
End Semester assessment: 60 Marks of 3.0 hours duration

***For examinations to be held in May 2023, 2024 and 2025***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS -**

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

**Section B** shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

**Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**



**BCA (Data Science) - SECOND SEMESTER**

Course: Skill Enhancement Course (SEC)  
Course Credits: (L-P-T)  
(2-0-0)  
Total marks: 50

Course Title: Cyber Security  
Course Code: USECST204  
Mid Semester assessment: 10 Marks of 1.5 hours duration  
End Semester assessment: 40 Marks of 2.5 hours duration

***For examinations to be held in May 2023, 2024 and 2025***

**Course objectives & learning outcomes:**

1. To provide knowledge about the PC Hardware.
2. To brief about different utilities and PC settings.
3. To develop the ability to configure, setup and troubleshoot PC.

**UNIT -I**

Cyberspace, Architecture of cyberspace, Internet, World Wide Web, Advent of internet, Internet infrastructure for data transfer and governance, Internets ociety, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

Classification of cyber crimes, Common cyber crimes-cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.

10 Hours

**UNIT -II**

Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India.

Introduction to Social networks, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media.

10 Hours

**UNIT-III**

Definition of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices.

Introduction to digital payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in authorized banking transactions

10 Hours

**Suggested readings/ references:**

1. R. C Mishra, "Cyber Crime Impact in the New Millennium", Auther Press Edition.
2. Sumit Belapure and Nina Godbole, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt. Ltd.
3. Henry A. Oliver, "Security in the Digital Age: Social Media Security Threats and Vulnerabilities", Pearson.
4. Elias M. Awad, "Electronic Commerce", Prentice Hall of India Pvt Ltd.
5. Kumar K, "Cyber Laws: Intellectual Property & E-Commerce Security", Dominant Publishers.
6. Eric Cole, Ronald Krutz, James W. Conley, "Network Security Bible", 2nd Edition, Wiley India Pvt. Ltd.
7. E. Maiwald, "Fundamentals of Network Security", McGraw Hill.



**BCA (Data Science) - SECOND SEMESTER**

Course: Skill Enhancement Course (SEC)  
Course Credits: (L-P-T)  
(2-0-0)  
Total marks: 50

Course Title: Cyber Security  
Course Code: USECST204  
Mid Semester assessment: 10 Marks of 1.5 hours duration  
End Semester assessment: 40 Marks of 2.5 hours duration

***For examinations to be held in May 2023, 2024 and 2025***

**NOTE FOR PAPER SETTERS FOR EXAMINATIONS -**

The question paper will be divided into the following two sections. No question shall be repeated in the question paper.

**Section A** shall consist Four (4) short answer questions (at least one from each unit). The students are required to attempt all questions. Each question shall be of 2½ Marks.

(4 x 2½ = 10 marks)

**Section B** shall consist Six (6) long answer questions (two from each unit). The students are required to attempt three questions. Each question shall be of 10 Marks.

(3 x 10 = 30 marks)

**Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.**

