BCA-MCA DUAL DEGREE (5 YRS.) SYLLABUS 2019 BATCH ONWARDS
(UPDATED ON 09.04.2021)

Semester 1st		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMCAS1-101	Communicative English	3	1	0	40	60	100	4
BMCAS1-102	Introduction to Information Technology	3	1	0	40	60	100	4
BMCAS1-103	Computer Organization	3	1	0	40	60	100	4
BMCAS1-104	Programming in C Language	3	1	0	40	60	100	4
BHUMA0-003	Human Value & Professional Ethics	3	1	0	40	60	100	4
BMCAS1-105	Software Lab.-I (Based on BMCAS1--102)	0	0	4	60	40	100	2
BMCAS1-106	Software Lab.-II (Based on BMCAS1--104)	0	0	4	60	40	100	2
Total		**15**	**5**	**8**	**320**	**380**	**700**	**24**

Semester 2nd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMCAS1 -201	Database Management System	3	1	0	40	60	100	4
BMCAS1 -202	Computer Network	3	1	0	40	60	100	4
BMCAS1 -203	Management Information System	3	1	0	40	60	100	4
BMCAS1 -204	Object Oriented Programming Language in C++	3	1	0	40	60	100	4
BMCAS1 -205	Operating System	3	0	0	40	60	100	3
BMCAS1 -206	Software Lab.-III (Based on BMCAS1--201)	0	0	4	60	40	100	2
BMCAS1-207	Software Lab.-II (Based on BMCAS1-- 204)	0	0	4	60	40	100	2
Total		**15**	**4**	**8**	**320**	**380**	**700**	**23**

Semester 3rd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMCAS1-301	Software Engineering	3	1	0	40	60	100	4
BMCAS1-302	Data Structure	3	1	0	40	60	100	4
BMCAS1-303	Fundamentals of Mathematics	3	1	0	40	60	100	4
BMCAS1-304	Programming in Java	3	1	0	40	60	100	4
BHUMA0-004	Drug Abuse: Problem, Management and Prevention	3	1	0	60	40	100	4
BMCAS1-305	Software Lab.-V (Based on BMCAS1--302)	0	0	4	60	40	100	2
BMCAS1-306	Software Lab.-VI (Based on BMCAS1--304)	0	0	4	60	40	100	2
Total		**15**	**5**	**8**	**340**	**360**	**700**	**24**

Semester 4th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMCAS1-401	Android Application Development	3	1	0	40	60	100	4
BMCAS1 -402	Software Project Management	3	1	0	40	60	100	4
BMCAS1-403	Linux Operating System	3	1	0	40	60	100	4
BMCAS1 -404	Discrete Structures	3	1	0	40	60	100	4
BMCAS1-405	Software Lab.-VII (Based on BMCAS1--401)	0	0	4	60	40	100	2
BMCAS1-406	Software Lab.-VIII (Based on BMCAS1--403)	0	0	4	60	40	100	2
Total		**12**	**4**	**8**	**280**	**320**	**600**	**20**

Semester 5th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMCAS1-501	Latest Trends in IT	3	1	0	40	60	100	4
BMCAS1-502	Artificial Intelligence	3	1	0	40	60	100	4
BMCAS1-503	Object Oriented Analysis and Design using UML	3	1	0	40	60	100	4
BMCAS1-504	Web Application Development	3	1	0	40	60	100	4
BMCAS1-505	Software Lab.-IX (Based on BMCAS1--503)	0	0	4	60	40	100	2
BMCAS1-506	Software Lab.-X (Based on BMCAS1--504)	0	0	4	60	40	100	2
Total		**12**	**4**	**8**	**280**	**320**	**600**	**20**

Semester 6th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMCAS1-601	Computer Graphics	3	1	0	40	60	100	4
BMCAS1-602	Network Security	3	1	0	40	60	100	4
BMCAS1-603	Soft Computing	3	1	0	40	60	100	4
BMCAS1-604	Software Lab- XI (Based on BMCAS1--601)	0	0	4	60	40	100	2
BMCAS1-605	Software Lab-XII (Based on BMCAS1--603)	0	0	4	60	40	100	2
BMCAS1-606	Software Project Development	0	0	8	60	40	100	4
Total		**9**	**3**	**16**	**300**	**300**	**600**	**20**

COMMUNICATIVE ENGLISH

Subject Code: BMCAS1-101 **LT PC** **Durations: 60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: The objectives of this course are to make students understand that both oral & written communications are equally important. After completion of this course the students should be comfortable with both verbal & written communications

INTRODUCTION TO INFORMATION TECHNOLOGY

Subject Code: BMCAS1--102 **LTPC** **Durations: 60 Hrs.**
3 1 0 4

Objectives and Expected Outcomes: This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology. After completion of this course students should be able to develop and analyze quality computer applications by applying knowledge of software engineering, algorithms, programming, database and networking.

Pursue advanced knowledge and professional development in the field of information technology

COMPUTER ORGANIZATION

Subject Code: BMCAS1--103 **LT PC** **Durations: 60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: This course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system. This includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design. This course will also expose students to the basic architecture of processing, memory and I/O organization in a computer system. After completion of this course the students will be able to understand the digital representation of data in a computer system. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit de

PROGRAMMING IN C LANGUAGE

Subject Code: BMCAS1--104 **L TPC** **Duration: 60 Hrs.**
3 1 0 4

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real-life problems and converting the solutions into computer program using C language (structured programming). After completion of this course students will learn to write algorithm for solutions to various real- life problems. Converting the algorithms into computer programs using C language.

HUMAN VALUES AND PROFESSIONAL ETHICS

SubjectCode: BHUMA0-003 **LT PC** **Durations: 60 Hrs.**
3 1 0 4

Objectives and Expected Outcomes: To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life – this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability; it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing)-it concentrates on providing "How to do" things. The aspects of understanding "What to do" or "Why something should be done" is assumed. No significant cogent material on understanding is included as a part of curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and superficial in real situations in their life. It has been experimented at IIITH, IITK and UPTU on a large scale with significant results.

After completion of this course the students will be able to evaluate an ethical life and profession ahead.

SOFTWARE LAB-I (BASED ON BMCAS1--102)

SubjectCode: BMCAS1--105 **L T PC**
0 0 4 2

This laboratory course will comprise an exercise to supplement what is learnt under paper BMCAS1--102 Introduction to Information Technology.

SOFTWARE LAB-II (BASED ON BMCAS1--104)

SubjectCode: BMCAS1--106 **L T PC**
0 0 4 2

This laboratory course will comprise and exercise to supplement what is learnt under paper BMCAS1—104 to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming).

DATABASE MANAGEMENT SYSTEM

SubjectCode:BMCAS1--201 **LT PC** **Durations:60 Hrs.**
3 1 0 4

Objectives and Expected Outcomes: The objective of this course is to describe a introduction to the discipline of database management system, to give good formal foundation on the data models and to introduce the concept of basic SQL as a Universal database language. After completion of this course students will learn: Will be able to comprehend and evaluate the role of database management systems. Effectively explains the basic concepts of databases and data models. Defines the basics of the relational data model.

COMPUTER NETWORK

SubjectCode:BMCAS1--202 **LT PC** **Durations: 60 Hrs.**
3 1 04

Objectives and Expected Outcomes: The objective of this course is to describe the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model, read the fundamental and basics of all layers and apply them in real time applications.
After completion of this course students will learn: To describe the functions of each layer in OSI and TCP/IP model. To classify the routing protocols and analyze how to assign the IP addresses for the given network. To explain the types of transmission media. Prepare a plan for anti-virus protection.

MANAGEMENT INFORMATION SYSTEM

SubjectCode:BMCAS1--203 **LTPC** **Durations: 60 Hrs.**
3 1 0 4

Objectives and Expected Outcomes: The main aim of this course is to define data capturing, data storage, retrieval and dissemination. After completion of this course students will be able to: To evaluate the role of information systems in today's competitive business environment. Assess the relationship between the digital firm, electronic commerce, electronic business and internet technology. Identify managerial risks related to information system organization processing and utilizing.

OBJECT ORIENTED PROGRAMMING USING C++

SubjectCode:BMCAS1--204 **L T PC** **Duration:60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: The objectives of the course are to have students identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, vectors, inheritance, and file I/O stream concepts.
After completion of this course students will be able to: Understand the difference between the top-down and bottom-up approach. Describe the object-oriented programming approach in connection with C++.Apply the concepts of object-oriented programming. Illustrate the process of data file manipulations using C++. Apply virtual and pure virtual function & complex programming situations.

OPERATING SYSTEM

SubjectCode:BMCAS1--205 **LT PC** **Durations: 60Hrs.**
3 10 4

Objectives and Expected Outcomes: To make the computer system convenient to use in an efficient manner, to hide the details of the hardware resources from the users and to provide users a convenient interface to use the computer system.
After completion of this course students will be able to: Identify and define key terms related to operating systems. Explain basic concepts related to concurrency and control of concurrent programs. Students have the logical, algorithmic, and mathematical capability to model and analyze real-world problems in different application domains.

SOFTWARE LAB-IV (BASED ON BMCAS1--201)

SubjectCode:BMCAS1--206 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 201 Database Management System. Student will be provided with Operational Knowledge and Implementation of Database using SQL.

SOFTWARE LAB-IV (BASED ON BMCAS1--204)

SubjectCode:BMCAS1--207 **L T PC**
0 04 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 204 Object oriented Programming using C++ .Student will be provided with Operational Knowledge and Implementation of numerical methods & statistical Techniques using C++ Language.

SOFTWARE ENGINEERING

SubjectCode:BMCAS1--301 **L T PC** **Duration: 60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: To apply principles of software development and evolution. To specify, abstract, verify, validate, plan, develop and manage large software and learn emerging trends in software engineering.
After completion of this course the students will be able to: Learn the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. Ability to communicate effectively with a range of audiences. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

DATA STRUCTURES

SubjectCode:BMCAS1—302 **L T PC** **Duration: 60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: To impart the basic concepts of data structures and algorithms, to understand concepts about searching and sorting techniques, to understand basic concepts about stacks, queues, lists, trees and graphs 4 To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structure.
After completion of this course students will be able to learn: Develops skills in implementations and applications of data structures. Implements basic algorithms for sorting and searching. Implements basic data structures such as stacks, queues and trees. Applies algorithms and data structures in various real-life software problems.

FUNDAMENTALS OF MATHEMATICS

SubjectCode:BMCAS1—303 **LTPC** **Duration: 60Hrs.**
3 104

Objectives and Expected Outcomes: To describe several areas of mathematics, describe several diverse examples of mathematics, Demonstrate the use of mathematical reasoning.
After completion of this course students will be able to learn: Understand, analyze and create mathematical arguments. Understand sets, perform operations and algebra on sets, describe sequences and summations.

PROGRAMMING IN JAVA

SubjectCode:BMCAS1-304 **LTPC** **Duration: 60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: To learn how to implement object-oriented designs with Java, to identify Java language components and how they work together in applications and to design and program stand-alone Java applications.
On completion of the course the student should be able to: Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.Readand make elementary modifications to Java programs that solve real-world problems, validate input in a Java program.

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

SubjectCode:BHUMA0--004 **LTPC** **Duration: 60Hrs.**
3 1 0 4

Objectives and Expected Outcomes: Determine the impact of drug use and SUDs on public health outcomes and clarify the impact of drug use and addiction on families and peers.
On completion of the course the student should be able to: Measure the societal costs associated with drug use and addiction

SOFTWARE LAB V (BASED ON BMCAS1 -302 DATA STRUCTURES)

SubjectCode:BMCAS1--305 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 302 Data Structures

SOFTWARE LAB VI (BASED ON BMCAS1-304 JAVA PROGRAMMING)

SubjectCode:BMCAS1--306 **LTPC**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: -304 Java Programming.

ANDROID APPLICATION DEVELOPMENT

SubjectCode:BMCAS1—401 **LTPC** **Duration: 60Hrs.**
3 104

Objectives and Expected Outcomes: To understand the concepts and techniques used in creating applications and to learn how to create user interfaces for android application.
On completion of the course the student should be able to: Create an android application from the scratch and deploy self- developed applications on android devices.

SOFTWARE PROJECT MANAGEMENT

SubjectCode:BMCAS1—402 **LTPC** **Duration: 60 Hrs.**
3 1 04

Objectives and Expected Outcomes: To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices, to explain methods of capturing, specifying, visualizing and analyzing software requirements and to understand need of project management and project management lifecycle.

On completion of the course the student should be able to: Define various software application domains and remember different process model used in software development. Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques. Generate project schedule and can construct, design and develop network diagram for different software modules.

LINUX OPERATING SYSTEM

SubjectCode:BMCAS1—403 **LTPC** **Duration: 60Hrs.**
3 10 4

Objectives and Expected Outcomes: To introduce Basic Linux general purpose Commands, to learn network Linux commands, to learn shell script and concepts and to learn file management and permission advance commands.
On completion of the course the student should be able to: Identify the basic Linux general purpose commands. Apply and change the ownership and file permissions using advance Linux command Implement shell scripts. Apply basic of administrative task. Apply networking Linux commands.

DISCRETE MATHEMATICS

SubjectCode:BMCAS1—404 **L T PC** **Duration: 60 Hrs.**
3 10 4

Objectives and Expected Outcomes: To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument). The subject enhances one's ability to reason and ability to

present a coherent and mathematically accurate argument.
On completion of the course the student should be able to: Write an argument using logical notation and determine if the argument is or is not valid. Understand the basic principles of sets and operations in sets. Prove basic set equalities. Apply counting principles to determine probabilities. Demonstrate different traversal methods for trees and graphs. Model problems in Computer Science using graphs and trees.

SOFTWARE LAB VII (BASED ON BMCAS1-401 ANDROID APPLICATION DEVELOPMENT)

SubjectCode:BMCAS1—405 **LTPC**
0042

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-:401 Android Application Development.

SOFTWARE LAB VIII (BASED ON BMCAS1-403 LINUX OPERATING SYSTEM)

SubjectCode:BMCAS1--406 **LT PC**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 403 Linux Operating System. Students are required to develop programs in Linux.

LATEST TRENDS IN IT

SubjectCode:BMCAS1—501 **L T PC** **Duration: 60 Hrs.**
3 10 4

Objectives and Expected Outcomes: To make aware student the changes in technologies, applications and Systems around us.
After completion of the course the student should be able to:

- Recognize the concepts of emerging technologies.
- Analyze the components of cloud computing.
- Critically analyze case studies to derive the best practice model to apply when developing and deploying parallel, distributed, cloud and IoT based applications.

ARTIFICIAL INTELLEGENCE

SubjectCode:BMCAS1—502 **L T PC** **Duration: 60 Hrs.**
3 10 4

Objectives and Expected Outcomes: The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.

After completion of this course the student will be able to understand the: Different types of AI agents. Various AI search algorithms. The fundamentals of knowledge representation.

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

SubjectCode:BMCAS1—503 **LTPC** **Duration: 60Hrs.**
3 10 4

Objectives and Expected Outcomes: Create a requirements model using UML class notations and use-cases based on statements of user requirements, and to analyze requirements models given to them for correctness and quality, Create the OO design of a system from the requirements model in terms of a high-level architecture description, and low-level models of structural organization and dynamic behavior using UML class, object, and sequence diagrams.
After completion of this course the students will be able to learn: Learn the basis of OO analysis and design skills. Learn the UML design diagrams. Learn to map design to code. Be exposed to various design techniques.

WEB APPLICATION DEVELOPMENT

SubjectCode:BMCAS1—504 **L T PC** **Duration: 60Hrs.**
310 4

Objectives and Expected Outcomes: To gain ability to develop responsive web applications 4. To explore different web extensions and web services standards.
After completion of this course the students will be able to: Develop skills in client-side web application development technologies including HTML, JavaScript, and JavaScript libraries. Design a web application using web programming patterns based on data analytics to enhance the front end user experience.

SOFTWARE LAB IX (BASED ON BMCAS1-503)

SubjectCode:BMCAS1—505 **LTPC**
0 0 42

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1-:503 Object oriented analysis and design using UML.

SOFTWARE LAB X (BASED ON BMCAS1-504)

SubjectCode:BMCAS1—506 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1-: 504 Web application and development.

COMPUTER GRAPHICS

SubjectCode:BMCAS1—601 **L T PC** **Duration: 60Hrs.**
3 104

Objectives and Expected Outcomes: To learn the basic principles of 3- dimensional computer graphics, provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition and to provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections
After completion of this course the students will be able to: To list the basic concepts used in computer graphics. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. To describe the importance of viewing and projections.

NETWORK SECURITY

SubjectCode:BMCAS1—602 **LTPC** **Duration: 60 Hrs.**
3 10 4

Objectives and Expected Outcomes: This Course focuses towards the introduction of network security using various cryptographic algorithms, underlying network security applications and it also focuses on the practical applications that have been implemented and are in use to provide email and web security.
After completion of this course the students will be able to:

- Describe network security services and mechanisms.
- Symmetrical and Asymmetrical cryptography.
- Data integrity, Authentication, Digital Signatures.
- Various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc.

SOFT COMPUTING

SubjectCode:BMCAS1-603 **LTPC** **Duration: 60Hrs**
3104

Objectives and Expected Outcomes: Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory and to introduce students to artificial neural networks and fuzzy theory from an engineering perspective.
After completion of this course the students will be able to: Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications. Reveal different applications of these models to solve engineering and other problems.

SOFTWARE LAB XI (BASED ON BMCAS1601)

Subject Code: BMCAS1—604 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1-: 601 Computer Graphics.

SOFTWARE LAB XII (BASED ON BMCAS1 603)

Subject Code: BMCAS1—605 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1-: 603 Soft Computing.