Academic Programme Guide
of
Bachelor of Computer Application
(BCA)

Based on Choice Based Credit System (CBCS)/Elective Course System

CHITKARA UNIVERSITY
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w.e.f.
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1. General Information

Bachelor of Computer Applications is a three-year undergraduate course that deals with information technology and computer applications. The course includes subjects such as core programming languages Java and C++, data structure, networking, and others. BCA graduates have good job prospects both in the government and private sector companies. After successfully passing their BCA course, students can easily find lucrative job opportunities in leading IT companies across the world.

The Programme Educational Objectives (PEO) are:

PEO 1:	To be able to attain and exhibit a good command over interpersonal communication skills, team work and leadership traits and follow the ethical practices in their professional life.
PEO 2:	To be a able to analyze the given problem/set of requirements and develop good quality software applications through application of the software development paradigms and choice of appropriate technology which may require learning the emerging technologies from time to time.
PEO 3:	To be able to make a choice to opt for professional career in IT and IT-enabled services or to pursue higher studies in the field of Computer Science and Applications and succeed in their academic, professional or entrepreneurial pursuits.
PEO 4:	To be aware of the emerging needs of the society and would be able to provide appropriate solutions to cater to those needs through life-long learning.

1.1 Programme Outcomes (PO)

The Programme is designed to provide the knowledge and skills. The precise aim of this course is to develop and transfer the right talent to meet the demands of corporate India and to bridge the gap between industry and academics. In such an environment, corporate India will need young and talented youth to actively participate, manage, design, develop, and lead several IT initiatives. It has not been better than this for aspirants of Bachelor of Computer Applications. The students shall be further groomed to work in a variety of organizational settings. The Programme Outcomes of BCA are summarized as below:

PO1: Application of Knowledge: Apply knowledge of software development paradigms in a systematic manner to solve real-time problems.

PO2: Employability: Build skills, knowledge and attitude necessary to work as responsible software professional.

PO3: Societal & Environmental Concern: Design solution for software application problems with appropriate consideration for societal and environmental issues.

PO4: Modern Tool Usage: Create, select and apply appropriate techniques, resources and modern IT tools.

PO5: Professional Ethics: Apply ethical principles and practices towards the use of technology and

commit to professional ethics and responsibilities.

PO6: Individual & Team Work: Function effectively as an individual, and as a member or a leader in diverse teams and multi-disciplinary fields.

PO7: Communication Efficacy: Communicate effectively and write effective reports and Design documents, make effective presentations and give and receive clear instructions.

PO8:Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PO9: Problem Analysis: Prepare plan, design and develop solutions for the real-world problems of the industry.

PO10: Innovation and Entrepreneurship: Identify opportunities; develop entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

2. Eligibility for Admission

The candidate must have passed his/her 10+2 from a recognized board of central or state government with a minimum of 50% marks. The candidate should have good moral character and must be in good mental and physical condition.

3. Programme Duration

An academic year shall be divided into regular semesters (known as term) for all the programs. The program of studies leading to the award of a degree consists of 6 terms as approved by the Academic Council. The maximum permissible duration for completion of the degree is 5 years, after the day of first registration.

Normal duration of the degree programme	Maximum time allowed for completion of the programme
3 years	5 years

4. Pedagogical Aspects

The structural layout of the BCA program and its courses will consist of lecture sessions, tutorials, practical sessions, and internship.

Lecture Sessions: Lectures will be delivered using the traditional Chalkboard method, supplemented by modern Information Communication Technology (ICT) methods. Students are encouraged to ask questions to make the lectures interactive and engaging. In some courses, case study-based methodology will be adopted, and the lectures will be supplemented by discussions of case studies.

Tutorial Sessions: The tutorial sessions consist of small groups of students. During the tutorial sessions, the students interact with the teachers to clear their doubts and get more insight into the subjects.

Lab/Practical Sessions: During lab/practical sessions, the students work on a prescribed list of experiments and apply the concepts learned during lecture/tutorial sessions. This helps the students to get an in-depth understanding of the complex theoretical concepts.

Internship: Students are allowed to undergo industry internships to work in a real-life problem-solving environment helping them to become industry-ready.

Besides the pedagogical aspects mentioned above, the curriculum is envisaged towards

inclusion of practices that can lead to holistic development for students considering the varied parameters that are defined in the Charter of the University.

5. Programme Structure

The various courses prescribed for a program may be categorized in terms of their academic affinity or their functional objectives as Core Courses and Elective courses.
Core Courses: Core courses are a compulsory set of papers that also include those offered for specialization in the branch/discipline.
Electives Courses: The category called "Electives" is conceptually different and operationally wider. For each program, there may be a specified number of electives classified as ProgramElectives or Open Electives.

A faculty advisor may be appointed to guide the students to opt for the elective courses that are relevant to the subject in which the student is registered for the program.

A credit is a convenient device to anticipate the number of hours per week of total effort including the class work of a student. The system recognizes only the formal contact hours in the classroom/studio and laboratory apart from self-study.

6. Rules for Attendance

The University expects its students to be regular in attending the classes. Attendance of 75% is compulsory in a course to be eligible to appear for the End-Term Examination. The students are also encouraged to participate in co-curricular activities and can do so in the 25% cushion provided in the attendance requirements. 10% concession in attendance requirements is possible only in case of extreme circumstances and at the sole discretion of the Vice-Chancellor or the competent authority appointed by the Vice-Chancellor.

7. Grading System

Grades are awarded to students based on the marks secured in the respective courses. The list of Letter Grades is given in table-1:

Table 1: Grade and grade points

Marks Secured in %	Grade	Grade Point	Qualitative Meaning
80-100	O	10	Outstanding
70-79	A+	9	Excellent
60-69	A	8	Very Good
55-59	B+	7	Good
50-54	B	6	Above Average
45-49	C	5	Average
40-44	P	4	Pass
0-39	F	0	Fail
-	I	0	Incomplete / Absent

7.1. Computation of SGPA and CGPA

The University follows the UGC-recommended procedure to compute the **Semester Grade Point Average** (SGPA) and **Cumulative Grade Point Average** (CGPA):

(i) The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA (S_i) = $\Sigma(C_i x\ G_i) / \Sigma C_i$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course.

(ii) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

CGPA = $\Sigma(C_i x\ S_i) / \Sigma\ C_i$

where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

(iii) The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

7.2 Illustration of Computation of SGPA and CGPA

Computation of SGPA and CGPA are calculated as described in Table 2 and Table 3 respectively.

Table 2: Illustration for SGPA

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA =139/20 =6.95**

Table 3: Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit:20 SGPA:6.9	Credit:22 SGPA:7.8	Credit:25 SGPA:5.6	Credit:26 SGPA:6.0
Semester 5	**Semester 6**	CGPA=6.73	
Credit:26 SGPA:6.3	Credit:25 SGPA:8.0		

$$Thus, CGPA = \frac{20X6.9 + 22X7.8 + 25X5.6 + 26X6.0 + 26X6.3 + 25X8.0}{144} = 6.73$$

Transcript: Based on the above criteria, the University may issue the transcript to the desiring students as per the University policy.

Evaluation for Engineering Exploration Courses: The evaluation of the courses under Engineering Exploration will consist of internal components and external component and will be conducted as per the details mentioned in the respective CHO.

Evaluation for MOOC Courses: The evaluation of the MOOC courses will be conducted as per the details mentioned in the respective CHO.

Evaluation for Global Exposure Courses: There will be only one evaluation at the end of the course. The type of evaluation may vary depending on the course type on the discretion of the concerned authority.

Evaluation for Mandatory Courses: There will be only one evaluation at the end of the course. The type of evaluation may vary depending on the course type on the discretion of the concerned authority.

8. Promotion and Registration

Any bonafide student, who appears for the examination conducted by the University, shall be promoted to the next higher semester and shall carry forward all course(s) in which he/ she is declared Fail. The student shall have to pass all papers within the stipulated maximum duration as prescribed by the University to qualify for the award of the degree.

All students are eligible to register for next semester irrespective of the number of backlogs. A student is not permitted to register in a term if:

- He/She has dues outstanding to the University, hostel, or any recognized authority or body of the University, or
- His/Her grade sheet in his/her immediately preceding term is withheld, or
- He/ She has been specifically debarred or asked to stay away from that term

Late registration may be granted in case a student fails to register on the stipulated date. Students failing to register on the specified day of registration will be allowed to register only after permission from the Head of the Department and after paying the stipulated late fee. Any students who have not registered will not be allowed to attend classes.

(a) If the registration of a student in a course is not found to be as per the regulations, his / her registration in that course will be canceled and the grade obtained, if any, will be rejected.

(b) The registration of a student in a course or complete set of courses in a term can be canceled by the concerned authority when he is found guilty in case of unfair means, breach of discipline, etc., or when he/she persistently and deliberately does not pay his dues.

(c) Absence for a period of four or more weeks at a stretch without any information to the concerned authority during a term shall result in automatic cancellation of the registration of a student from all the courses in that term.

A student who is duly registered in a term is considered to be on the rolls of the University. After registration, if he/she withdraws from the term, or has been given prior permission to temporarily withdraw from the University for the term, or has been asked to stay away by an appropriate authority of the University will be considered to be on the rolls of the University for that term. While such a student retains the nominal advantage of being on the rolls of the University, the loss of time from studies and its consequences cannot be helped by the University.

If for any valid reason, a student is unable to register for a term, he/she must seek prior permission from the Head/Dean of the Department to drop the term. If such permission has not been requested or after a request, the permission has been denied, his/her name would be struck off the rolls of the University and he/she would no longer be a student of the University. His/her case will be automatically processed and the file will be closed. However, if such a student, after his/her name has been struck off the rolls of the University, is permitted to come back, his/her case can be considered at the sole discretion of the competent authority of the University with the provision that all his/ her previous records as a former student are revived under the current academic and administrative structure, regulations and schedule offers.

9. Migration/Credit Transfer/Lateral Entry

The following procedures will be followed for credit transfer for a student under migration, who studied in other Universities in India and Abroad:

The credits earned by the student from other universities in India or abroad shall be transferred as per the mapping of the courses. The Degree shall only be awarded to the candidate subject to the condition that the student has earned the minimum number of credits defined by the Academic Regulation/APG of the Programme run by the Chitkara University.

In case a student undergoes an international exchange programme or internship for 1 semester/ 1 year/ 2 years, then the courses, credits, and grades earned by the student during that period will be reflected on the grade card issued by the Chitkara University after successful mapping of the courses/credits. The courses will be marked as (*) on the grade card/transcript.

10. Eligibility for the Award of the Degree

A student will be declared as a "Pass" in a course if he/she obtains the minimum passing marks (40%) in the course enrolled and has appeared in the end-term examination of that course. A student must complete (Pass) all the required courses (in all years) in which he/she has registered.

OR

Any specific criteria followed by the University for any Particular Course.

To be eligible for the award of Bachelor of Computer Application (BCA), a student must earn a minimum of 120 credits and a minimum CGPA of 4.5 in the BCA program.

11. Program Overview

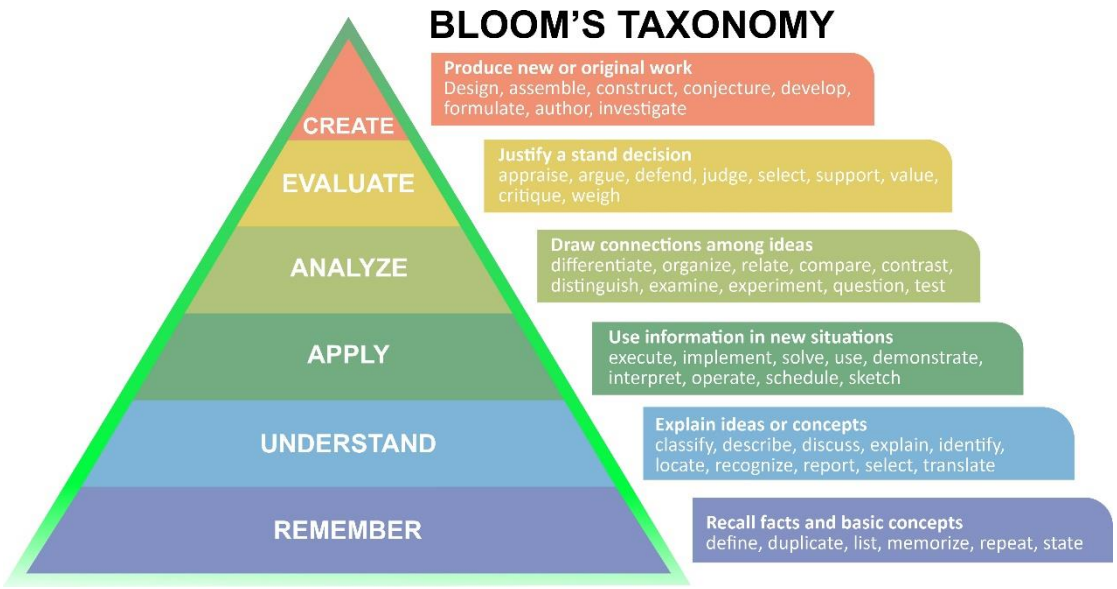
The BCA Program consists of courses under the following categories:

Course Category	Definition
BS	Basic Science Courses
HSMC-HS	Humanities, Social Sciences, Management
ESC-GES	Engineering Science course
PCC-CS	Professional Core Courses
MC	Mandatory Course
Proj	Project

- In addition to these courses, a student must take UGC mandatory courses.
- The number of courses and total credits may vary based on the choice of electives/specialization/additional courses by the student.
- Students may earn credits in their final year by taking industrial training.
- Students may also choose additional electives instead of industrial training in the final year.

12. Assessments

A lot of emphasis is laid on the quality of the assignment, so as to make sure that all assessment components are incorporated while following different levels of Bloom's Taxonomy as mentioned in the figure below.



Further, a focused effort will be made to align every single test item in assessment components with one or the other course learning outcome.

13. Examples of questions as per different levels of Blooms Taxonomy

a. Remember

Retrieving, recognizing, and recalling relevant knowledge from long-term memory.

Sample Questions:

1. Define schema and instances.
2. List the advantages of a database over a file system.

b. Understand

Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

Sample Questions:

1. Explain the three-level architecture with data independence.
2. What is Deadlock and how it can be avoided?

c. Applying

Carrying out or using a procedure through executing or implementing.

Sample Question:

Chitkara University aims to create a database to manage information related to students, courses, and faculty members. The university has provided you with the following requirements:

- Students should be uniquely identified by their student ID, and their information should include their name, date of birth, and contact information (address, email, phone).
- Courses offered by the university should have a unique course code, a title, and the maximum number of students allowed to enroll in each course.

- Faculty members should be identified by their employee ID, and their information should include their name, department, and contact information.
- Students can enroll in multiple courses, and each course can have multiple students. A student can enroll in a course only once.
- Each course is taught by one faculty member, but a faculty member can teach multiple courses.
- Faculty members may also serve as academic advisors to students. A student can have one academic advisor.

Draw an Entity-Relationship (ER) diagram that includes entities, attributes, relationships, and cardinality constraints to represent the university database in accordance with these requirements.

d. Analyzing

Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing

Sample Questions:

1. A class of 10 students consists of 5 males and 5 females. We intend to train a model based on their past scores to predict the future score. The average score of females is 60 whereas that of male is 80. The overall average of the class is 70. Give two ways of predicting the score and analyse them to fit the model.
2. Return statement can only be used to return a single value. Can multiple values be returned from a function? Justify your answer.

e. Creating & Evaluating

Produce new or original work

Sample Questions:

Alpha Inc. company is preparing its production plan for 2021. The quarterly demands for 2020 are given as follows:

Quarter	Demand
1	200
2	190
3	250
4	290

Seasonality indexes for each quarter are 0.92, 0.90, 0.97, and 1.10, which are estimated based on actual demands from 2000 to 2020 and are believed to apply to 2021. Use an appropriate forecasting model to obtain the demands of all 4 quarters in 2021.

14. Course Handout

An elaborate document named as ‘Course Handout’ providing details of a particular course is shared with students at the beginning of every semester. This document typically has various components like-

a) Title of the course
b) Course code
c) Name of the faculty members teaching that course in a typical semester
d) Scope and objective of the course
e) Course learning outcomes
f) Alignment of every single CLO with Program outcomes (CLO-PO mapping)
g) Detailed delivery plan
h) Information about reliable and authenticated web resources
i) Assessment methodologies etc.

Faculty members are expected to religiously follow the Contents of the course handout in complete letter and spirit.

15. Program Scheme BCA-2023

On the basis of Choice Based Credits System as per UGC notification dated 10th, August, 2016.

BCA Batch 2023

Semester-1				
S.No	**Course Code**	**Course Title**	**L-T-P**	**Credits**
1	23AM007	Mathematical Foundation of Computer Science	3-0-0	3
2	23CA001	Fundamentals of Computer Science	3-0-0	3
3	23CA002	Office Management Tools	3-0-2	4
4	23CA003	Web Technologies I	3-0-4	5
5	23CA004	Programming with C-I	3-0-4	5
6	23EL001	Functional English	1-0-0	1
7	23ES001	Environmental Science	2-0-0	2
Total			28	23

Semester-2				
S.No	**Course Code**	**Course Title**	**L-T-P**	**Credits**
1	23CA005	Programming With C - II	3-0-4	5
2	23CA006	Web Technologies - II	3-0-4	5
3	23CA007	Operating System	3-0-2	4
4	23CA009	Social Media Marketing	3-0-0	3
5	23CA008	Computer Organization	3-0-0	3
6	23CA010	Integrated Project - I	0-0-4	2
7	23EL002	Communicative English	3-0-0	3
Total			28	23

Semester-3				
S.No	**Course Code**	**Course Title**	**L-T-P**	**Credits**
1	24CA011	Fundamentals of Object Oriented Programming	3-0-4	5
2	24CA012	Database Management System	3-0-2	4
3	24CA013	Software Engineering	4-0-0	4
4	24CA014	Discrete Mathematics	4-0-0	4
5	24CA015	Advanced Spreadsheet Tools	3-0-2	4
6	24EL003	Soft Skills	3-0-0	3
7	HR101	Human Values and Professional Ethics	Non-credit	Non-credit
Total			32	24

Semester-4				
S.No	**Course Code**	**Course Title**	**L-T-P**	**Credits**
1	24CA016	Data Structures	4-0-2	5
2	24CA017	Linux and Shell Programming	3-0-2	4
3	24CA018	Back End Engineering	4-0-2	5
4	24CA019	Digital Marketing	3-0-2	4
5	24EL004	Business English	3-0-0	3
6	24CA020	Integrated Project - II	0-0-4	2
7	24CS501	Cyber Security	Non-credit	Non-credit
Total			29	23

Semester-5				
S.No	**Course Code**	**Course Title**	**L-T-P**	**Credits**
1	**24CA021**	**JAVA Programming**	**3-0-2**	**4**
2	**24CA022**	**Fundamentals of Computer Networks**	**2-0-2**	**3**
3	**24CA023**	**Introduction to Software Testing**	**2-0-2**	**3**
4	**24CA24**	**Basics of Information Security**	**2-0-0**	**2**
5	**24CA25**	**English Language Proficiency Development**	**2-0-0**	**2**
6	**24CA26**	**Disaster Management**	**Non-credit**	**Non-credit**
Total			**17**	**14**

Semester-6				
S.No	**Course Code**	**Course Title**	**L-T-P**	**Credits**
1	**24CA27**	**Programming using Python**	**3-0-2**	**4**
2	**24CA28**	**Artificial Intelligence**	**2-0-1**	**3**
3	**24CA29**	**Industrial Training**	**0-0-24**	**12**
	OR			
	24CA30	**Advanced Database Management System**	**3-0-2**	**4**
	24CA31	**Machine Learning Applications**	**3-0-2**	**4**
	24CA32	**Data Analytics using Python**	**3-0-2**	**4**
Total				**19**

16. COURSE OUTLINE

The course outline for the core courses is given here. The detailed course structure, examination pattern, evaluation components, pedagogy, mode of lecture delivery, question paper format as per Bloom's taxonomy, CO-PO mapping, and other details for all courses are given in the Course Handout of the respective courses.

23AM007-Mathematical Foundation of Computer Science

The course offers the capacity to utilize mathematical concepts in order to resolve difficulties concerning computer hardware and software. The identification, formulation, and analysis of issues connected to networks are also addressed. Additionally, the course includes the process of drawing well-founded conclusions by employing mathematical principles.

23CA001-Fundamentals of Computer Science

Introduction to computer fundamentals, Number systems, Conversion from one number system to another, Binary arithmetic, Classification of Computers, Memory Systems, Input-output devices, Introduction to the internet, Threats, Computer security fundamentals.

23CA002-Office Management Tools

Operating System -software and hardware, Common utilities, Word Processing, Mail Merge, Macros, Inserting hyperlinks, cross reference, citations, Spread Sheet, Elements of Electronics Spread Sheet, Applications, Creating and Opening of Spread Sheet, Statistical and Financial function, drawing different types of charts, Sort and Filter Data. Presentation Software, Creating, Modifying and enhancing a presentation.

23CA003-Web Technologies I

Introduction to Web Technologies, HTML Anatomy, HTML structure, HTML tags, attributes, table, form, form validation, including CSS in HTML, CSS selectors, the box model, position, display, media queries, CSS transition & animation, static and dynamic website.

23CA004-Programming with C-I

Problem Solving Techniques, Flowchart, Introduction to C, Data types and Input Output, Expressions and Operators, Decision making statements, Conditional operators and switch statement, Loop Control structure, Functions, Recursion, Storage Classes, Pointers, One Dimensional Arrays, and strings.

23EL001-Functional English

Functional English is designed to equip students with the necessary language skills for effective communication in real-life situations. This course focuses on enhancing listening, speaking, reading, and writing abilities, while also emphasizing vocabulary development and grammar usage. Through interactive activities, discussions, and assignments, students will develop practical language skills to navigate various personal and professional scenarios.

23ES001-Environmental Science

Definition, scope, importance, need for public awareness, natural resources, renewable and non-renewable resources, water resources, ecosystems, biodiversity & its conservation, threats to biodiversity, environmental pollution, disaster management, environment protection acts, welfare program.

23CA005-Programming With C – II

Storage Classes, Searching and Sorting, Pointers, Two Dimensional Arrays, Strings, Recursion, Dynamic Memory Allocation, Structures and Unions, Stacks and Queues

23CA006-Web Technologies – II

Introduction to JavaScript basics, Arrays & Functions, Objects, JSON(Objects, JSON), Document Object Model, Events and event handler, Web storage, Project and Async Programming.

23CA007-Operating System

Introduction to Operating system, Process Concepts, Process Scheduling, Memory Management, Memory Allocation techniques, Virtual memory, Page Faults and Page Replacement, Page Replacement Algorithms, Thrashing, Segmentation, Case Study: Windows, Case Study: Linux, Introduction to Shell Scripting

23CA009-Social Media Marketing

Social Media Marketing, Social Media Platforms, Difference between Major Social Media Platforms, Problems associated with Social Media Marketing, Social Media Marketing v/s Traditional Marketing, Social Media Marketing Plan, Social Media Goals, Social Media Audience Analysis, Social Media Marketing Strategy, Integrating Marketing Strategy with Social Media Marketing, Social Media Content, Audience Engagement, Content Scheduling, Content Management and Control, Social Media , Advertising Tools, Targeting in Social Media Advertising, Planning Social Media Campaigns, Executing Social Media Campaigns, Social Media Analytics Tools.

23CA008-Computer Organization

Introduction to Logic gates and Combinational circuits, Multiplexer and Demultiplexer, Sequential circuits, Basic Functional units of Computers, Basic Computer Organization and Design, Types of instructions, Memory Organization, Mapping, Mapping Functions, Central Processing Unit organization, Input –Output Organization, Pipelining.

23CA010-Integrated Project – I

The Integrated Project aims to help students bring their knowledge and vision to life. This can improve the quality of the final product and develop better team dynamics. The project work will help students acquire the skills required to solve a software-related problem and work in a team environment.

23EL002-Communicative English

Introduction to communication, storytelling sessions, speaking skills, picture description, listening skills, reading comprehension, writing skills, grammar and vocabulary, cultural competence, debates and discussions, interview skills, mock interviews, and presentation skills.

24CA011-Fundamentals of Object Oriented Programming

This course introduces Object-Oriented Programming principles and C++ fundamentals. Topics covered include OOP concepts, C++ program structure, data types, operators, basic C++ programming, arrays, array operations, strings, functions, structures, pointers, classes, constructors, friend functions, operator overloading, inheritance, virtual functions, and pure virtual functions. Dynamic memory allocation is also discussed.

24CA012-Database Management System

Introduction to Database System, Database System Architecture, Entity Relationship Model, Data Models, Relational Algebra, Relational Calculus, Dependencies, Introduction to Normal Forms and its types & Anomalies, Introduction to Database Transaction, Concurrency Management, Concurrency Control, Database Recovery, Database Security and Integrity

24CA013-Software Engineering

Introduction to software engineering, software process models, types of requirements, design methodology, cohesion, coupling, design models, DFA tools, software testing, software maintenance, COCOMO model, risk management, software quality, software quality assurance, reverse engineering.

24CA014-Discrete Mathematics

Introduction, Recurrence Relation, Characteristic polynomial & Introduction to generating functions, Logic, Complexity Analysis, Counting Principles, Graph Theory, Euler's formula & its Applications, Trees

24CA015-Advanced Spreadsheet Tools

Workbook management, data entry, cell formatting, and named ranges. Students then delve into advanced functions such as logical operations, lookup functions, text manipulation, and date/time calculations. The course progresses to explore statistical and financial functions, error handling, and the use of array formulas. PivotTables and Pivot Charts are extensively covered, from basic creation to advanced features like calculated fields and dynamic charts. Advanced data visualization techniques including combo charts, Sparklines, and custom chart types are taught alongside in-depth instruction on conditional formatting using various rules and data bars. Practical skills in importing/exporting data, managing large datasets, and utilizing the Excel Data Model for complex analysis are also emphasized.

24EL003-Soft Skills

The "Soft Skills" course is designed to equip students with essential interpersonal and communication skills that are crucial for personal and professional success. The course begins with an introduction to the importance of soft skills in the workplace, emphasizing how these skills complement technical abilities and contribute to overall career growth. Students will explore various aspects of effective communication, including verbal and non-verbal communication, active listening, and presentation skills. The course also covers teamwork and collaboration, teaching students how to work effectively in diverse teams, resolve conflicts, and build strong professional relationships.

24CS501-Cyber Security

Introduction to Security, Security principles, threats and attack techniques, Basics of Cryptography, Cryptographic mechanisms, Classical Encryption Techniques, Symmetric and Asymmetric cryptography, Introduction to cybercrime, cybercrime and information security, Classifications of cybercrimes, Cybercrime and the Indian ITA 2000, Cyber offenses, Botnets- The fuel for cybercrime, Phishing, Password cracking, key loggers and SQL injection, attacks on wireless networks, Cost of cybercrimes and IPR issues, lessons for organization, web threats for organization, security and privacy implications from cloud computing, social media marketing, security risks and perils for organizations, social computing and the associated challenges for organizations, protecting people's privacy in the organization, organizational guidelines for internet usage, safe computing guidelines and computer usage policy, incident handling, Cyber Forensics, Best practices for organizations, Media and Asset Protection, Importance of endpoint security in organizations, cybercrime and cyber terrorism, Intellectual property in the cyberspace, the ethical dimensions of cybercrimes, the Psychology, mindset and skills of hackers and other cybercriminals, Cybercrime, Illustrations of financial frauds in cyber domain, digital signature related crime scenarios.

24CA016-Data Structures

Students will delve into the fundamental concepts of data organization and storage, exploring various data structures such as arrays, linked lists, stacks, queues, trees, and graphs. The course covers essential algorithms for sorting and searching, including bubble sort, merge sort, quick sort, binary search, and linear search. Students will learn to implement and optimize these data structures and algorithms, gaining a deep understanding of their applications and performance characteristics.

24CA017-Linux and Shell Programming

The course introduces students to the Linux operating system, focusing on essential commands and file management techniques. Students will learn to write and execute shell scripts, utilizing shell variables and control structures to automate tasks and streamline workflows. The course also covers process management, job scheduling, and basic networking commands, providing students with the skills needed to configure and maintain Linux systems. Additionally, students will explore system administration topics such as user and group management, system monitoring, and performance tuning.

24CA018-Back End Engineering

The course focuses on server-side development, teaching students to build and maintain robust back-end systems. The course covers server-side programming languages such as Node.jsand Python, as well as database management techniques for both SQL and NoSQL databases. Students will learn to design and implement APIs, handle user authentication and authorization, and deploy web servers. The course also emphasizes performance optimization strategies, including caching and load balancing, to ensure efficient and scalable back-end systems.

24CA019-Digital Marketing

Students will explore various digital marketing channels and strategies, including search engine optimization (SEO), social media marketing, email marketing, and pay-per-click (PPC) advertising. The course covers keyword research, content strategy, campaign management, and web analytics tools, providing students with the skills needed to create and measure effective digital marketing campaigns. Students will learn to analyze data and optimize their marketing efforts to achieve the best possible results.

24EL004-Business English

Business English aims to improve students' professional communication skills, focusing on writing, speaking, listening, and reading. The course covers business letters and emails, report writing, presentations, meetings, and negotiations. Students will also develop active listening techniques and learn to understand different accents and dialects. The course emphasizes cross-cultural communication, teaching students to navigate global business etiquette and cultural sensitivity.

24CA020-Integrated Project - II

24CA020 Integrated Project - II allows students to apply their knowledge in a comprehensive project that integrates various aspects of their coursework. Students will engage in project planning, defining project scope, setting objectives and milestones, conducting research and analysis, designing and developing systems, testing and evaluating performance, and documenting their work. The course also emphasizes team collaboration, with students taking on different roles and responsibilities to ensure effective communication and successful project completion.

24CA021-JAVA Programming

The course introduces students to the fundamentals of Java programming, covering basic syntax, object-oriented programming concepts, and core libraries. Students will learn to develop applications using Java, focusing on topics such as inheritance, polymorphism, exception handling, and file I/O. The course also includes advanced topics like multithreading, networking, and GUI development, providing a comprehensive understanding of Java programming.

24CA022-Fundamentals of Computer Networks

The course explores the principles and practices of computer networking. Students will learn about network architectures, protocols, and standards, including the OSI and TCP/IP models. The course covers topics such as data transmission, network topologies, routing, switching, and network security. Practical exercises and lab sessions will help students gain hands-on experience in configuring and managing networks.

24CA023-Introduction to Software Testing

Students will learn the importance of software testing in the software development lifecycle. The course covers various testing methodologies, including manual and automated testing, unit testing, integration testing, system testing, and acceptance testing. Students will also explore test case design, test management tools, and techniques for ensuring software quality and reliability.

24CA24-Basics of Information Security

The course is an overview of the key concepts and practices in information security. Students will learn about threats and vulnerabilities, risk management, cryptography, access control, and security policies. The course also covers network security, application security, and incident response, equipping students with the knowledge and skills needed to protect information systems.

24CA25-English Language Proficiency Development

The course aims to enhance students' proficiency in English, focusing on reading, writing, listening, and speaking skills. The course covers grammar, vocabulary, and pronunciation, as well as practical communication skills for academic and professional settings. Students will engage in various activities, such as discussions, presentations, and writing exercises, to improve their language abilities**.**

24CA26 -Disaster Management

The course introduces students to the principles and practices of disaster management. The course covers the types and causes of disasters, disaster risk reduction, emergency response, and recovery strategies. Students will learn about the roles and responsibilities of various stakeholders in disaster management and explore case studies to understand real-world applications.

24CA27-Programming using Python

Programming using Python focuses on teaching students the basics of Python programming. The course covers syntax, data types, control structures, functions, and modules. Students will learn to develop applications using Python, with an emphasis on problem-solving and algorithm development. The course also includes topics such as file handling, exception handling, and libraries for data analysis and visualization.

24CA28-Artificial Intelligence

The course is an introduction to the concepts and techniques of artificial intelligence. Students will learn about machine learning, neural networks, natural language processing, and robotics. The course covers algorithms and models used in AI, as well as practical applications in various domains. Students will gain hands-on experience through projects and lab sessions.

24CA29-Industrial Training

The course offers students the opportunity to gain practical experience in a real-world work environment. Students will apply their knowledge and skills in a professional setting, working on projects and tasks relevant to their field of study. The training aims to enhance students' employability and provide insights into industry practices and standards.

24CA30-Advanced Database Management System

Advanced Database Management System delves into advanced topics in database management. Students will learn about database design, normalization, query optimization, transaction management, and distributed databases. The course also covers emerging trends in database technology, such as NoSQL databases and big data analytics.

24CA31-Machine Learning Applications

It focuses on the practical applications of machine learning techniques. Students will learn about supervised and unsupervised learning, feature selection, model evaluation, and performance metrics. The course includes hands-on projects where students will apply machine learning algorithms to real-world problems, using tools and libraries such as scikit-learn and TensorFlow.

24CA32-Data Analytics using Python

Data Analytics using Python teaches students how to analyze and interpret data using Python. The course covers data manipulation, visualization, and statistical analysis. Students will learn to use libraries such as pandas, NumPy, and Matplotlib to perform data analysis tasks. The course also includes topics such as data cleaning, exploratory data analysis, and machine learning for data-driven decision-making.