



गोंय विद्यापीठ

ताळगांव पठार

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(Accredited by NAAC)

GU/Acad –PG/BoS -NEP/2023/102/28

Date: 15.06.2023

CIRCULAR

The University has decided to implement the UGC Curriculum and Credit Framework for the Undergraduate Programme (CCFUP) of **Bachelor of Science in Computer Science/Bachelor of Science in Computer Science (Honours)** under the National Education Policy (NEP) 2020 from the Academic Year 2023-2024 onwards.

The approved Syllabus of Semesters I and II of the **Bachelor of Science in Computer Science/Bachelor of Science in Computer Science (Honours)** Programme is attached.

Principals of Affiliated Colleges offering the **Bachelor of Science in Computer Science/Bachelor of Science in Computer Science (Honours)** Programme are requested to take note of the above and bring the contents of this Circular to the notice of all concerned.

(Ashwin Lawande)

Assistant Registrar – Academic-PG

To,

1. The Principals of Affiliated Colleges offering the Bachelor of Science in Computer Science /Bachelor of Science in Computer Science (Honours) Programme.

Copy to:

1. The Director, Directorate of Higher Education, Govt of Goa.
2. The Dean, Goa Business School, Goa University.
3. The Vice-Deans, Goa Business School, Goa University.
4. The Chairperson, BoS in Computer Science & Technology.
5. The Controller of Examinations, Goa University.
6. The Assistant Registrar, UG Examinations, Goa University.
7. Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

Goa University

Programme Structure for Semester I to VIII Under Graduate Programme

Semester	Major -Core	Minor	MC	AEC	SEC	I	D	VAC	Total Credits	Exit
I	Major- 1 CSC-100 Computer Organisation (3T + 1P)	Minor -1 CSC-111 (E-Commerce) (4T) OR CSC- 112 (Computer Software Fundamentals) (4T)	MC-1 CSC-131 (Emerging Trends in Computers) (3T) OR CSC-132 (Computer Applications) (3T)		SEC-1 CSC-141 (PC Troubleshooting) (1T + 2P) OR CSC-142 (Multimedia and Web Design) (1T + 2P) OR CSC-143 (Data Analytics using Spreadsheets -I) (1T + 2P) OR CSC-144 (Desktop Publishing) (1T + 2P) OR CSC-145 (Basic Computer Applications) (1T + 2P)				20	

II		<p>Minor-2 CSC- 113 (Digital Marketing) (4T) OR CSC- 114 (Social Media Marketing) (4T)</p>	<p>MC-2 CSC -133 (Cyber Security Essentials) (3T)</p>		<p>SEC-2 CSC-146 (Basics of Python Programming) (1T + 2P) OR CSC-147 (Graphical User Interface Design) (1T + 2P) OR CSC-148 (Data Analytics using Spreadsheets -II) (1T + 2P) OR CSC-149 (Data and Business Analytics) (1T + 2P) OR CSC-150 (Database Management and Analysis) (1T + 2P)</p>				20	<p>EXT-1 CSC-161 (Project in Industry / Academic Institute) (4)</p>
III	<p>Major 2 CSC -200 (Programming using C ++) (3T + 1P) Major 3 CSC- 201 (Mathematical</p>	<p>Minor -3 CSC- 211 (Problem Solving and Programming Concepts) (3T + 1P) OR CSC -212</p>	<p>MC-3 CSC-231 (Web Designing) (3T) OR CSC-232 (Application Software for Social Science) (3T) OR</p>		<p>CSC-241 (Mobile App Development) (1T + 2P) OR CSC-242 (Digital Marketing) (1T + 2P)</p>				20	

	Foundations for Computer Science) (3T + 1P)	(Office Administration) (3T + 1P) OR CSC -213 (Cyber Security) (3T + 1P)	CSC-233 (Application Software for Science) (3T) OR CSC-234 (Application Software for Literature) (3T) OR CSC-235 (Latex) (3T) OR CSC-236 (3D Graphics Design) (3T)		OR CSC-243 (Embedded Systems) (1T + 2P) OR CSC-244 (Game Development) (1T + 2P) OR CSC-245 (3D Modelling and Animation) (1T + 2P) OR CSC-246 (Data Management Essentials) (1T + 2P) OR CSC-247 (Inventory Management Software) (1T + 2P)						
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IV	<p>Major 4 CSC -202 (Data Structures and Algorithms)(3T+1P)</p> <p>Major 5 CSC -203 (Object Oriented Technologies) (3T+1P)</p> <p>Major 6 CSC -204 (Operating System) (4T)</p> <p>Major 7 CSC- 205 (Operating System Lab) (2P)</p>	<p>Minor-4 VET CSC-221 (Introduction to Python Programming) (3T + 1P)</p> <p>OR</p> <p>CSC- 222 (Visual Computing) (3T + 1P)</p> <p>OR</p> <p>CSC -223 (Multimedia Technologies) (3T + 1P)</p>							20	EXT-2 CSC-261 (Project in Industry / Academic Institute) (4)
V	<p>Major 8 CSC -300 (Database Management System) (4T)</p> <p>Major 9 CSC- 301 (Computer Networks) (3T +1P)</p> <p>Major 10 CSC- 302 (Software Engineering) (3T+1P)</p>	<p>Minor VET -5 CSC -321 (Python for Data Science) (3T + 1P)</p> <p>OR</p> <p>CSC- 322 (Image Processing) (3T + 1P)</p> <p>OR</p>							20	

	Major 11 CSC- 303 (DBMS Lab) (2P)	CSC- 323 (Statistical Package) (3T + 1P)								
VI	Major 12 CSC-304 (Cloud Computing) (3T+1P) Major 13 CSC-305 (Foundations of Data Science) (3T+1P) Major 14 CSC-306 (Software Quality Assurance) (3T+1P) Major 15 CSC -307 (Project) (4)	Minor VET-6 CSC- 324 (R Programming for Data Science) (3T + 1P) OR CSC- 325 (Computer Graphics) (3T + 1P) OR CSC- 326 (Business Intelligence) (3T + 1P)						20		
VII	Major 16 CSC-400 (Design and Analysis of Algorithms) (3T+1P) Major 17 CSC-401 (Artificial Intelligence) (3T + 1P) Major 18 CSC-402 (Formal	Minor -7 CSC- 411 (Ethical Hacking) (3T + 1P)						20		

	Language and Automata Theory) (3T + 1P) Major 19 CSC-403 (Network Security) (3T + 1P)									
VIII	Major 20 CSC-404 Machine Learning (4) Major 21 CSC-405 Internet of Things(4) Major 22 CSC-406 Introduction to Parallel Computing(4) Major 23 CSC-407 (4T)**	Minor-8 CSC- 412 (Operations Research) (3T + 1P)						20		

****(Title of the Course will be provided separately)

Name of the Programme: Bachelor of Science in Computer Science (Honours)**Course Code: CSC-100****Title of the Course: Computer Organization****Number of Credits: 4 (3T+1P)****Effective from AY: 2023-24**

Pre-requisites for the Course:	Nil	
Course Objectives:	<ol style="list-style-type: none">1. Conceptualize the basics of Computer Organizational and Architectural issues and classify the computers based upon performance and machine instructions.2. Learn various data transfer techniques and the I/O interfaces3. Estimate and compare performances of various classes of memory4. Understand the basics of ALU implementation, hardwired and microprogrammed control unit, pipelining and parallel architectures	
Theory:	<ol style="list-style-type: none">1. Introduction to Logic Gates and Boolean Algebra: Logic Gates, Boolean Algebra, Combinational circuits, Karnaugh Map	4 hours
	<ol style="list-style-type: none">2. Introduction to Computer Architecture: Introduction to Computer Architecture, Flynn's Classification of Computers, Performance Metrics (like Latency, throughput), Fundamental Blocks of Computer (like CPU, I/O subsystems, memory, control unit), computer function, interconnection structures, Bus interconnections	8 hours
	<ol style="list-style-type: none">3. Instruction Set Architecture (ISA): Introduction to Instruction Set, Types of ISA; RISC, CISC; Processor Organization, Registers organization, Instruction Execution Cycle, Instruction formats, Addressing Modes; Register Transfer Language (RTL), Assembly Language Programming, X86 -Architecture, ARM Architecture	13 hours
	<ol style="list-style-type: none">4. Memory Hierarchy: Hierarchical memory organization, Types of Memory-internal and external, Cache memory, Memory interleaving,	5 hours
	<ol style="list-style-type: none">5. Data representation: Data Type Representation, Number System, Signed number, fixed, floating point, character representation, Addition, Subtraction, Multiplication - Shift and Add, Booth's Algorithm, Division	7 hours
	<ol style="list-style-type: none">6. Peripheral devices: Types of Peripheral Devices, I/O subsystem, programmed I/O, Interrupt-driven I/O, DMA, I/O channels and processors	8 hours
Practical:	Sample Assignments for the Practical Component - <ol style="list-style-type: none">1. Introduction to 8086 architecture and instruction set and Writing assembly language programs in 8086 using MASM or compatible assembler either in windows or Linux2. Find the sum of $1 + 2 + 3 + \dots + n$	30 hours

	<ol style="list-style-type: none"> 3. Display the multiplication table of a number 4. Store and retrieve numbers from memory 5. Sort the numbers stored in the memory 6. Installing Linux / Windows Operating System, Partitioning and formatting disk, Installing applications device drivers, working with files, mounting file systems, checking system space, creating, modifying and deleting user accounts 7. Study of Linux Commands 8. Shell Programming in Unix/Linux, arithmetic operations, loops, files Ex. Write a BASH shell script prime which will accept a number b and display first n prime numbers in standard output. 9. Shell scripting using general-purpose utilities. Ex. A) Write a menu driven shell script which will print the following menu and execute the given task to display result on standard output. <ol style="list-style-type: none"> a) Display calendar of current month b) Display today's date and time c) Display usernames those are currently logged in the system d) Display your name at given x, y position e) Display your terminal number f) Exit 10. Shell programming using filters (including grep, egrep, fgrep) 	
Pedagogy:	PowerPoint, Tutorials, Hybrid learning	
References/ Readings:	<ol style="list-style-type: none"> 1. Computer Architecture: A Quantitative Approach by John L. Hennessy & David A. Patterson, 5th Edition, Morgan Kaufmann 2. William Stallings, "Computer Organization and Architecture : Designing for performance", 9th Edition, Prentice Hall of India. 	
Course Outcomes:	<p>At the end of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the theory and architecture of central processing unit, I/O and memory organization 2. Analyze some of the design issues in terms of speed, technology, cost, performance, CPU architecture. 3. Describe the concepts of parallel processing, pipelining and interprocessor communication. 4. Represent different number systems, and perform various binary operations 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-111

Title of the Course: E-Commerce

Number of Credits: 4 (4 Theory)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	This Course aims - <ul style="list-style-type: none">● To develop an understanding of Web-based Commerce● To equip students to assess-commerce requirements of a business● To enable students to develop - business plans and e-commerce applications	
Content:	1. Introduction to Electronic Commerce Meaning, Nature and scope of e-commerce,History of e-commerce, Business applications of e-commerce, E-CommerceModels:-(B2B,B2C,C2C,B2G),Advantages and Disadvantages of e-commerce, Applications of M-Commerce	6 hours
	2. E-Commerce Web-sites Websites as marketplace, Role of website in B2C e-commerce, Website design principles, Alternative methods of customer communication such as e-mail, Email etiquette and e-mail security	6 hours
	3. Online Marketing Online marketing and advertising, Push and pull approaches, Web counters, Web advertisements, Content marketing, Need of Digital Marketing for an e-commerce Business, Search Engine Optimization(SEO),Search Engine Marketing(SEM),Social Media Marketing(SMM), Web Analytics	10 hours
	4. Applications of E-commerce Applications of e-commerce to Supply chain management Applications of e-commerce to Customer Relationship Management, Product and service digitization, Remote servicing	6 hours
	5. Business to Consumer E-CommerceApplications Cataloguing,Order planning and order generation,Cost estimation and pricing,Order receipt and accounting,Order selection and prioritization,Order scheduling,Order fulfilling,Order delivery,Order billing,Post sales service	6 hours
	6. Business to Business E-Commerce Need and Models of B2B e-commerce,Using public and private computer networks for B2B trading; EDI and paperless trading, Characteristic features of EDI service arrangement,EDI architecture and standards,Reasons for slow acceptability of EDI,Value Added Networks	10 hours
	7. Electronic Payment System	6 hours

	Types of payment systems, credit cards, debit cards, mobile all etc,Electronic Fund Transfer(EFT),Operational credit and legal risk of e-payment,Risk management options for e-payment systems	
	8. Security Issues in E-Commerce Risks of e-commerce,Types and sources of threats to e-commerce;Protecting electronic commerce assets and intellectual property,Firewalls,Client server network security,Security Protocols–SSL,SET,S-HTTP,Data and message security,Security tools, Digital identity and electronic signature, Encryption and concept of public and private key infrastructure;Risk management approach to ecommerce security	10 hours
Pedagogy:	PowerPoint presentations, Case studies	
References/ Readings:	ReferenceBooks: 1. Agarwala,KalesN.,AmityAll DeekshaAgarwala, 2. Business on the Net: An Introduction to the Whats and Hows of E Commerce,Macmillan India Ltd, 2000 3. Diwan, Pragand Sunil Sharma, Electronic Commerce- A Manager's Guide to E Business,Vanity Books International, Delhi. 4. Fitzgerald, Business Data Communication Network, McGrawHill, 1998. 5. Kalakota,Ravi and Andrew.Whinston, Frontiers of Electronic Commerce, Addison Wesley, 1999. 6. Dishek J. Mankad,Understanding Digital Marketing: Strategies for online success, 2019 NPTELResources: https://nptel.ac.in/content/storage2/courses/106108103/pdf/PPTs/mod13.pdf	
Course Outcomes:	On completion of the course students will be able to:- 1. Describe the basics of e-commerce. 2. Explain the design principles of e-commerce websites. 3. Explain the different models of e-commerce. 4. Describe the different electronic payment systems. 5. Explain the security issues, security mechanism and threats to e-commerce applications.	

Name of the Programme: Bachelor of Science in Computer Science (Honours)**Course Code: CSC-112****Title of the Course: Computer Software Fundamentals****Number of Credits: 4 (4T)****Effective from AY: 2023-24**

Pre-requisites for the Course:	Nil	
Course Objectives:	This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology	
Content:	<p>Unit I : Introduction of IT Information: Prerequisites of Information, Need for Information Technology and its advantages; Information Technology: Definition and components Basic Computer Organization Application of IT (Science and Engineering, Business & Commerce, Education, Governance, Medicine, Entertainment)</p> <p>Unit II : Data And Information</p> <ul style="list-style-type: none"> ● Data and Information: Definition, Types of data, Qualities of Information ● Data Representation: Character formats- ASCII, Unicode (Definition, Adding regional languages, Phonetic keyboards ● Number system: Binary, decimal, Conversion ● Data Organization: Directory structure, File formats and Compression (Text, Audio, Image, Video) ● Data Backup: Techniques, Scheduler, Online backup, Advantages ● Device Interfaces and Data Storage: Data device Interface access methods (USB, IDE /SATA), ● Optical memory (Blue ray), Flash memory (USB Sticks, Memory Cards, SD, MMC, Micro SD), Magnetic Memory (External disks), New Devices (Solid state drives) <p>Unit III : Software: System and Applications</p> <ul style="list-style-type: none"> ● Relationship between Hardware and Software ● Programming Languages: Low level, High level, Translators ● System Programs: Operating systems: Operating systems ● Definition and functions of operating system, Examples of operating System (Windows, Linux, Online OS, Virtual OS, Comparison), Multi boot systems ● (disk partitions and logical drives) Directory Structure: System directories, Users (administrator, limited rights user and guest), User directories (directory permission) ● Services, drives and hardware interfaces ● Application Programs : Definition , Examples Introduction to Mathematical Computation Packages Human computer interaction (HCI) 	<p>5 hours</p> <p>15 hours</p> <p>15 hours</p>

	<p>Unit IV : Basics of Computer Networking and data communication</p> <p>Networking basics, why networking of computers is needed, Types of networks-LAN, MAN, WAN, Network Components – H/W, Software, Communication channels, Network Devices, Network topologies. Communication Process, Data Transmission speed, Communication Types (modes) Internet – role and importance, IP Addressing – public Vs Private, Static Vs Dynamic; WWW & related protocols;</p>	15 hours
	<p>Unit V : Future IT trends</p> <ul style="list-style-type: none"> ● Artificial Intelligence (AI) and Automation (Definition, Applications) ● IoT and Edge Computing ● Cloud Infrastructure ● Virtual reality & Augmented Reality ● Business Intelligence 	10 hours
Pedagogy:	Lecture method using ICT tools	
References/ Readings:	<ol style="list-style-type: none"> 1. A. Goel, Computer Fundamentals, Pearson Education, 2010. 2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006 3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007 	
Course Outcomes:	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Explain basic concepts and terminology of information technology. 2. Explain basics of personal computers and their operations. 3. Identify various I/O devices, storage and networking devices 4. Familiarize with recent trend of IT 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-113

Title of the Course: Digital Marketing

Number of Credits: 4 (4 Theory)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To acquaint the students with basic principles and concepts of digital marketing & advertising To understand and familiarize the students with the concept of Digital Marketing techniques like Adwords, search advertising, display advertising. To understand the concept of Search Engine Optimization (SEO)	
Content:	1. Fundamentals of Digital Marketing Marketing in the digital world; Integrated marketing- The Phygital; Global trends in Digital Marketing; Digital channels- Paid, Owned and Earn; Fundamentals on the primary asset-your website; Careers in digital marketing; Skill development in Digital marketing	5 hours
	2. Ad Words Fundamentals Understanding Pay-per-click Advertisement; Significance and evolution of Ad Words in PPC Bing Ads V/s Google Ads- overview; AdWords Certification- Overview, Benefits and Preparation; Google Ad Networks; Different Ad Formats; Keywords - significance and planning; Using Keyword Planner and other tools; Keyword matches and their usage; Campaign Structure and Organization Quality, Rank and Relevance of Ads; Bidding and budget; Targeting Setting Extensions and their usage; Ad policies and approvals; Reports and Analysis Metrics; Conversion Tracking; Campaign Optimization	10 hours
	3. Search & Display Advertising with Adwords Search with Adwords Keywords - planning, matching and combination; Specifications of an Ad and how to put it to good use; Managing Invalid Clicks; Ad extensions and usage; Dynamic search ads; Landing page - your virtual front; Campaign Experiment; Opportunities Tab; AdWords APIs; Ad Words editor-Benefits and usage; Managing multiple accounts Display with Adwords Google Display Network and Partnerships; Double click Ad Exchange and AdSense Campaign Creation and Structuring for display; Keyword and targeting through display network; Campaign Metrics, Analysis and optimization	15 hours
	4. SEO Basics How search engines work; Different Search results and significance; Query types and significance; What is SEO and key factors determining the same; Components on SEO-onsite and off page; Keyword Planning; Using tools to get effective keywords; Long tail keywords-the hidden gems; Art and science	15 hours

	of tags-URL, title, meta, H1, alt text, etc.; Write a good meta description; Page speed - its impact and improvement areas; All about links- broken, internal et al; Dealing with duplicate content; Robot. Txt and Sitemap; Structured data and schema.org	
	<p>5. SEO Advance Concepts</p> <p>Link building basics; Avoiding harmful links; Finding and leveraging link building opportunities; Creating a link building plan; Major Google updates and their implication son SEO; Using Search Console for SEO; KPIs of SEO; Tools for SEO; Moz SEO Products; SEM rush Competitive Research and Business Intelligence Software; Competition Analysis for SEO; Overall planning for SEO; Understanding nuances of local and international SEO; Accelerated mobile pages and SEO; Artificial Intelligence,Voice search and SEO–what to look forward</p>	15 hours
Pedagogy:	PowerPoint presentations, Case studies	
References/ Readings:	<p>Recommended Reference Books:</p> <ol style="list-style-type: none"> 1. Dave Chaffey & Fiona Ellis-Chadwick, DigitalMarketing: Strategy, Implementation and Practice, Pearson Education 2. Ekaterina Walter, The Power of Visual Storytelling, McGraw-Hill Education 3. Ben Hunt, Convert!: Designing Websites For Traffic and Conversions, John Wiley & Sons 4. Lon Safko, The Social Media Bible: Tactics, Tools, & Strategies for Business Success, Brilliance Audio; Unabridged Edition 5. Pam Didner, Global Content Marketing, McGraw-Hill Education 6. Joe Pulizzi, Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses, McGraw-Hill Education 7. Mike Monteiro, You're My Favorite Client, A Book A part 8. Seth Godin, All Marketers Are Liars, Portfolio 9. JayBaer, Youtility: Why Smart Marketing Is About Help Not Hype, Portfolio 10. Russell Glass & Sean Callahan, The Big Data-Driven Business, Wiley 11. Damian Ryan and Calvin Jones, Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page 12. Ryan Deiss and Russ Henneberry, Digital Marketing for Dummies, JohnWileyand Sons 13. Corey Rabazinski, Google Adwords for Beginners: A Do-It-Yourself Guide to PPC Advertising, Create Space Independent Publishing Platform 	
Course Outcomes:	<p>At the end of the course learner will be able to</p> <ol style="list-style-type: none"> 1. Apply the understanding of digital landscape and building a case to leverage online channels 2. Strategize, implement and optimize online campaigns successfully 3. Develop and design Online Advertising campaigns, AdWords Campaign management and Campaign Basics across search. 4. Drive organic traffic through Search Engine Optimization 5. Apply advance concept of Search Engine Optimization to capture the right intent 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-114

Title of the Course: Social Media Marketing

Number of Credits: 4 (4 Theory)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	<ul style="list-style-type: none">● To understand the concept of Social Media Marketing platform.● To understand video and mobile platform advertising.● To understand and apply the concept of web and google analytics.● To acquire understanding of LinkedIn, Twitter, Pinterest Marketing● To Measure, Analyze and Optimize Social Media Marketing Campaigns● To create an effective Digital Marketing Plan.	
Content:	1. Introduction to Social Media Marketing Evolution and importance of Social Media ;What social media can do for you?; Different social media platforms;Unwritten rules of Social Media ;Facebook for business; Using of Facebook groups, pages and events; Using of Facebook tabs and apps;Running Facebook ads;AdManager and Power Editor in Facebook;Targeting –the structured approach; Facebook page Insights	15 hours
	2. YouTube Video and Mobile Advertising YouTube - why do you need to be there?; YouTube format, tools & targeting; Video Campaign Creation;Video Campaign track and optimization;Video Ad performance & best practices; YouTube Analytics.Importance of Mobile and Opportunities to Leverage; Key Objectives for Mobile Marketing;AdFormats and Networks for Mobile;Mobile Site: Key Considerations; Mobile App :Key Considerations;Mobile specific bidding and targeting;Apps Marketing,Mobile Analytics,Reporting and Optimization	10 hours
	3. Media Marketing with Twitter, LinkedIn, Instagram & Snapchat Introduction to Twitter and its terminologies; Creating a good Twitter profile; Building followers on Twitter;Using Twitter Chats;Twitter as an influencer marketing tool; Twitter ads; Twitter Analytics; LinkedIn for Business; Profile, pages and Pulse in LinkedIn; LinkedIn Ad; LinkedIn Analytics; B2B marketing using LinkedIn; Introduction to Pinterest for Business; Pinterest strategies; Instagram for business; Instagram strategies;New kid on the block–Snapchat;Online Reputation Management ;Social media tool sand how to use them;Creating social media calendar and workflow	15 hours
	4. Web Analytics Introduction to web analytics; How web analytics works, Analytics Framework; Goals, Objectives and KPIs;	10 hours

	Contextualizing of Data; Segmentation of Data; Making analytics actionable; Attribution Modeling; URL tracking and UTM builder; Clickstream, HeatMap and other forms of WebAnalytics; A/B testing	
	<p>5. GoogleAnalytics</p> <p>How Google Analytics (GA) work; Dimensions ,metrics and other common terminologies;Setting up Google analytics;Tracking,Reports and Dashboards ;Acquisition, Behaviour and Conversion;Visitors Analysis; Source and Medium analytics; Conversion tracking; Content Performance Analytics; Userflow;Leveraging real time analytics; Content Experiment; Linking Search Console and AdWords with Google Analytics; Intro to Google Data Studio</p>	10 hours
Pedagogy:	PowerPoint presentations, Case studies	
References/ Readings:	<p>Recommended Reference Books:</p> <ol style="list-style-type: none"> 1. Dave Chaffey & Fiona Ellis-Chadwick, Digital Marketing: Strategy, Implementation and Practice,PearsonEducation 2. Ekaterina Walter, Jessica Gioglio; The Power of Visual Storytelling : How to Use Visuals, Videos, and Social Media to Market Your Brand, McGraw Hill Education 3. BenHunt, Convert!: Designing Websites For Traffic and Conversions, John Wiley & Sons 4. Lon Safko, The Social Media Bible: Tactics, Tools, & Strategies for Business Success, Brilliance Audio; Unabridged Edition 5. PamDidner, Global Content Marketing, McGraw-Hill Education 6. Joe Pulizzi,ContentInc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses, McGraw-Hill Education 7. MikeMonteiro,You'reMyFavoriteClient,ABookApart 8. Seth Godin, All Marketers Are Liars, Portfolio 9. JayBaer, Yutility: Why Smart Marketing Is About Help Not Hype, Portfolio 10. Russell Glass & Sean Callahan, The Big Data- Driven Business,Wiley 11. Damian Ryanand Calvin Jones, Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, KoganPage 12. Ryan Deiss and Russ Henneberry, Digital Marketing for Dummies, John Wiley and Sons 13. Corey Rabazinski, Google Adwords for Beginners: A Do-It-Yourself Guide to PPC Advertising, CreateSpace Independent Publishing Platform 	
Course Outcomes:	<p>On completion of the course learner will be able to:</p> <ol style="list-style-type: none"> 1. Explain basics of Social Media Marketing. 2. Able to use mobile and video media for online advertising, & AdWords campaign management. 3. Able to use Twitter, LinkedIn, Instagram & similar media for promotion. 4. Comfortably apply relevant tools and concepts to execute measure and monitor an annual online marketing plan and use analytics to drive action able improvements 5. Use new digital marketing techniques into strategic marketing plan 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-131

Title of the Course: Emerging Trends in Computer

Number of Credits: 3T

Effective from AY: 2023-24

Pre-requisites for the Course:	NIL	
Course Objectives:	This course will enable students to explore current breakthrough technologies in the areas of Artificial Intelligence (AI), Big data and Business Intelligence, IOT, Blockchain that have emerged over the past few years. It will also prepare the students to use technology in their respective professional preparations.	
Content:	Unit 1 : Artificial Intelligence AI Concept, Scope of AI, Components of AI, Types of AI, Machine Learning (ML) and Natural Language Processing (NLP), Applications of AI, the state of art AI today	8 hours
	Unit 2 : Business Intelligence (BI) and Big data BI- Definition, Importance, Benefits of Business Intelligence, How BI process works, Stages of Business Intelligence, Big data – Definition, Characteristics, Challenges with Big Data, Traditional Business Intelligence (BI) versus Big Data. Big Data Applications in Business	10 hours
	Unit 3 : Internet of Things (IoT) and Embedded Systems Definition, Characteristics of Embedded System, Real time systems, Real time tasks. Processor basics: General Processors in Computer Vs Embedded Processors, Microcontrollers, Microcontroller Properties, Components of Microcontrollers, Components of Embedded Systems, Introduction to embedded processor Definition, Characteristics of IoT, Trends in Adoption of IoT, IoT Devices, IoT Devices Vs Computers, Societal Benefits of IoT, Technical Building Blocks. IoT functional blocks, IoT enabling technologies, IoT levels and deployment templates, Applications in IoT	12 hours
	Unit 4 : Cloud Computing Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven-step model of migration into a Cloud, Trends in Computing. Cloud Service Models: SaaS, PaaS, IaaS, Storage, Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Cloud System Architecture, Cloud Deployment Models	8 hours

	<p>Unit 5: Blockchain and Cryptocurrency Introduction to Blockchain Technology and its Importance, Evolution of the Blockchain Technology, Elements of a Blockchain A basic crypto currency, Creation of coins, Payments and double spending, Bitcoin –Digital Signatures as Identities – eWallets – Personal Crypto security - Bitcoin Mining</p>	7 hours
Pedagogy:	PowerPoint, YouTube Videos	
References/ Readings:	<ol style="list-style-type: none"> 1. Artificial Intelligence: A Modern Approach, Stuart Russel and Peter Norvig, Pearson 3 rd 2015 2. Big Data Analytics, RadhaShankarmani, M Vijayalakshmi, Second Edition, 2017, WileyBig Data and Hadoop, V.K Jain Khanna Publishing, First 2018 3. Getting Started with the Internet of Things, Cuno Pfister O'Reilly Sixth 2018 4. Internet of Things: A Hands-On Approach by Arsheep Bahga 5. Cloud Computing by Anandamurugan, T.Priyaa et al 6. Blockchain for Beginners: The Art of Decentralisation & Cryptography, Tejaswini N and Yathish R 	
e-Resources and other Digital Material	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/106/104/106104189/ 2. https://www.coursera.org/specializations/big-data 3. https://www.edx.org/course/big-data-fundamentals 4. https://www.edx.org/course/artificial-intelligence-ai 5. https://www.udemy.com/course/artificial-intelligence-az 	
Course Outcomes:	<p>At the end of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Identify different emerging technologies 2. Select appropriate technology for a given task 3. Identify necessary inputs for applications of emerging technologies 4. Define emerging trends in Computer Science 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-132

Title of the Course: Computer Applications

Number of Credits: 3T

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To provide an understanding of essential Information Technology concepts To familiarize and learn use of various types of IT tools	
	Unit 1 : (Computer Basics) Introduction to computers – Definition, Characteristics, Classification of computers, Components of a Computer System –Hardware Components -Central Processing Unit, Input devices, Output devices, Computer Memory. Categories of Software - System Software and Application Software, Operating Systems - definition and functions. Data - Definition, Types, Data Representation, Types of Number system- Binary, Octal, Hexadecimal Conversion between number bases	8 hours
	Unit 2 : (Word Processor) Word processing concepts: Use of Templates, Working with word document: Editing text, Find and replace text. Formatting- Text, Paragraphs, Styles, Columns. Bullets and numbering, Tabs, Indent, Page Formatting. Design Themes, Page Background. Page setup Insert: Tables, Illustrations, Links, Comments, Header and Footer, Symbols. Tables: Inserting, filling and formatting a table, Changing cell width and height, Alignment of Text in cell, Delete / Insertion of Row, Column and Merging & Splitting of Cells, Border and Shading. Referencing- Captions, Footnotes and Endnotes Citations and Bibliography, Reference Tables and Indexes, Bookmarks and Cross-References.	10 hours
	Unit 3 : Spreadsheets Spreadsheet concepts: Managing worksheets; Formatting, Conditional formatting, Entering data, Editing, Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions, Summarizing data using filter. Pivot tables to analyze data. Using What-If Scenario Manager, Goal Seek. Printing a worksheet-working with page breaks, adding headers or footers, choosing what to print.	10 hours

	<p>Unit 4 : Presentation Software</p> <p>Creating a presentation, creating a Presentation Using a Template, Creating a Blank Presentation, Inserting & Editing Text on Slides, Inserting and Deleting Slides in a Presentation, Saving a Presentation, Manipulating Slides, Inserting Table, Adding ClipArt Pictures, Inserting Other Objects, Resizing and Scaling an Object, Creating & using Master Slide, Presentation of Slides, Choosing a Set Up for Presentation, Running a Slide Show, Transition and Slide Timings, Automating a Slide Show, Providing Aesthetics to Slides & Printing, Enhancing Text Presentation, Working with Color and Line Style, Adding Movie and Sound, Adding Headers, Footers and Notes, Printing Slides and Handouts.</p>	10 hours
	<p>Unit 5 : User Generated Content</p> <p>Blogs and Wikis. Online Data Capture Tools: Types of data capture form templates (Personal, Work and Education). Question Formats for data capture (short answer, paragraph, multiple choice, check- box, drop-down, linear-scale, multiple choice grid). Data form design (Add new question, add section, add title/description/image/video). Data form distribution techniques (Send via email, publish on social media, send as link). Response management (Print responses, Export to spreadsheet, View analysis, Include analysis in word processing reports)</p>	7 hours
Pedagogy:	PowerPoint, Tutorials	
References/ Readings:	<ol style="list-style-type: none"> 1. Introduction to Information Technology by ITL Education Solutions Limited, second edition. 2. "O" Level made simple "Introduction to ICT resources" by Satish Jain, Shashank Jain, Shashi Singh & M. Geetha Iyer, BPB publication. 3. Computer fundamentals fourth edition by Pradeep K. Sinha and Priti Sinha BPB publications 4. Information Technology The breaking wave by Dennis Curtin Tata McGraw-hill edition 	
Course Outcomes:	<p>At the end of the course the learner will be able to:</p> <ol style="list-style-type: none"> 1. Understand the essential of Information Technology Concepts 2. Develop practical skills in data capture, analysis and presentation, report formatting 3. Use a range of current, standard, Office Productivity software applications 4. Apply the basic concepts of a word processing package, electronic spreadsheet and PowerPoint tool 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-133

Title of the Course: Cyber Security Essentials

Number of Credits: 03

Effective from AY: 2023-24

Pre-requisites for the Course:	The student should have basic knowledge on how to use computers and internet technology.	
Course Objectives:	<ul style="list-style-type: none">● To introduce principles of cyber security and have an understanding on the cyber-crimes taking place.● To have an understanding of the existing legal framework and laws on cyber security.● To enable students to adopt safe practices when using social media platforms and digital payment systems.	
Content:	1. Introduction to Cyber security Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World Wide Web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.	5 hours
	2. Cyber crime and Cyber law 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, 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, Organisations dealing with Cyber-crime and Cyber security in India, Case studies.	10 hours
	3. Social Media Overview and Security Introduction to Social networks. Types of Socialmedia, Social media platforms, Social media monitoring, Hashtag, Viralcontent, Social media marketing, Social media privacy, Challenges, Opportunities and pitfalls in online social network, 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, Case studies.	10 hours

	<p>4. E-Commerce and Digital Payments Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stakeholders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act, 2007.</p>	10 hours
	<p>5. Digital Devices Security, Tools and Technologies for Cyber Security End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall and Anti-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.</p>	10 hours
Pedagogy:	Lecture method, Case Studies, Hands-on Training, Group Discussions	
References/ Readings:	<ol style="list-style-type: none"> 1. Cyber Crime Impact in the New Millennium, by R. C Mishra, Author Press. Edition 2010. 2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sunit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011) 3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001) 4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd. 5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers. 6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd. 7. Fundamentals of Network Security by E. Maiwald, McGraw Hill. 	
Course Outcomes:	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Explain the concept of Cyber security and issues and challenges associated with it. 2. Explain the cyber crimes, their nature, legal remedies and as to how to report the crimes through available platforms and procedures. 3. Explain various privacy and security concerns on online social media and the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms. 4. Explain the basic concepts related to E-Commerce and digital payments, digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds. 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-141

Title of the Course: PC Troubleshooting

Number of Credits: 3 (1 Theory + 2 Practical)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To make the students capable of understanding the functioning of hardware parts and develop skills in diagnosing the faults and troubleshooting the computer system.	
Content:	1. Hardware Basics Basic terms, concepts, and functions of system modules (System board, firmware, storage devices, monitor, boot process, ports). CMOS and BIOS, Motherboard, SMPS	3 hours
	2. Memory Module and Hard disk Different types of Memory Modules, Tips on installing memory chips. Disk structure: Cylinders, heads, platters, tracks and sectors, structure of a disk, hard disk controllers. Types of interface controller and drives.	4 hours
	3. Input/Output Devices Keyboard and Mouse, Scanner and its types, CD-ROM Drives, Monitors: Display basics, Display adapter cards, VGA and super VGA, Printer: Types, Interfaces, Connection to Computers.	4 hours
	4. Troubleshooting and Preventive Maintenance Troubleshooting basics, Troubleshooting by visual Inspection, Preventative Maintenance. POST: Functions, Test Sequence, Error messages, Troubleshooting Procedures and Preventative Maintenance. Power Supply and UPS.	4 hours
Pedagogy:	PowerPoint Presentations, Hands on	
References/ Readings:	1. IBM PC & Clones: Hardware Troubleshooting and Maintenance by B. Govindarajulu, Tata McGraw Hill 2. PC Upgrade & Repair Bible, Wiley India. 3. Computer Installation and Servicing by D Balasubramanian	
Course Outcomes:	At the completion of this course, the student will be able to: 1. Explain Basics of Hardware Components. 2. Acquire knowledge of Finding Faults in Components 3. Install, Configure and maintain various components in computer systems and peripherals. 4. Diagnose faults of Different Components 5. Repair and maintain computer systems and its peripherals.	

Cont..

List of Experiments:**(Perform at least 10 experiments from the list given below)**

Sr.No.	Name of the Experiment (60 hours)
1	Disassemble the PC carefully. Assemble the same PC you have disassembled and boot the system.
2	Observe various connectors, ports back and front side of the computer and write their purpose. (e.g. Power, PS/2keyboard and mouse, Serial and parallel, USB, VGA, LAN, Audio & microphone, Firewire, HDMI, games, SATA etc.)
3	Identify the on-board features of the motherboard like network capabilities, and gaming capabilities. Install the given driver and test the computer for proper functioning. Remove the drivers for some devices like sound, display, network etc. and again install them and check the proper functioning of the computer. Upgrade the given PC by adding RAM and additional HardDisk.
4	Observe the power supply (SMPS) and measure their voltage levels of a given SMPS. Measure various voltage levels, such as motherboard, storage devices and fan etc. using a multimeter. Do a detailed study on all the components and devices on the given power supply. Observe different types of Switch Mode Power Supply – AT, ATX, NLX. Record the different types of power connectors on the motherboard.
5	Identify BIOS settings, demonstrate starting BIOS, identify how to disable unused devices to decrease security risks. Change booting of computer with different secondary storage CD,HDD,USBetc.
6	Perform low-level and high-level formatting of Hard Disk. Format the given Hard Disk using any one technique and create three partitions, two for operation systems and one for data.
7	Install OS of different types (Windows and Linux). Also,search for various data recovery software on pendrive/HDD.
8	Open different types of keyboards and mouse and observe the internal circuits. Observe and write steps to troubleshoot, maintain and clean the keyboard and mouse.
9	Observe different types of printers. Install driver and interface the printers with PC/Laptop on any operating system (connect the printer to one PC directly using USB/Serial/Parallel/Wi-Fi as per the availability; test the functioning of the printer.)
10	Learn the interfacing, installation and working of various devices such as scanner, projector, web cam etc. Connect all these devices with the given PC, install & test them.
11	Identify the problem in the given PC, using the given troubleshooting sequence, fix the issue, record the given problem, and produce proper documentation of your work.

12	<p>Recognize common symptoms associated with diagnosing and troubleshooting PCs and utilize Windows built-in diagnostic tools.</p> <ul style="list-style-type: none"> ● Identify general troubleshooting techniques and strategies ● Utilize scandisk, control panel, boot-up menu, and startup disk as diagnostic tools. ● Access Microsoft Knowledge Base on the Internet to solve common problems. ● Identify the common problems associated with shutdown, configuration, and cabling. ● Identify problems associated with heating and cooling of the internal components. ● Identify problems with installing internal devices such as hard drive, tape drives, or CD-ROM drive. ● Recognize and interpret the meaning of common error codes and start up messages. ● Recognize windows-specific printing problems and corrections.
13	<p>Perform computer maintenance and preventative maintenance functions.</p> <ul style="list-style-type: none"> ● Perform physical cleaning (internal and external) of a personal computer. ● Demonstrate how to adjust basic performance settings. ● Perform hard drive file system maintenance. ● Identify anti-virus software and applications
14	<p>Utilize the Internet to download device drivers. Installation of drivers of various devices from the internet. Demonstrate to remove unwanted software applications.</p>

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-142

Title of the Course: Multimedia and Web Design

Number of Credits: 3 (1 T + 2 P)

Effective from AY: 2023-24

Pre-requisites for the Course:	NIL
Course Objectives:	<ol style="list-style-type: none">1. To introduce the basic concepts of Multimedia and Web Designing2. To develop skills and competencies in image, video editing.3. To acquire and develop skills to create web pages using HTML, CSS, Bootstrap and JavaScript
Content:	No of hours
Color Theory Color Basics, Color Systems, Color Wheel, Complementary Colors, After Images, Color Combinations, Color & Contrast, Itten's Contrasts, Proportion & Intensity, Contrast & dominance, Shades & Tints, Color Studies, Color Gamut, ICC profiles, Gamma Correction.	03 Hours
Computer Graphics Difference between Raster and Vector Graphics , Raster graphics : resolution, image compression, file formats, manipulation, Geometrical transformations, Vector graphics – fundamentals, file formats, shapes, transforms and filters.	02 Hours
Sound : Sound Design, Audio Codec & file formats, processing sound, compression	01 Hour
Video : Aspect Ratio Frame Size, Frame Rate, Regions, Video Codec & Formats, Processing.	01 Hour
Web Architecture, HTML : Introduction to internet and web design. Basic concepts of web architecture. Introduction to hypertext mark-up language (html), creating web pages, lists, hyperlinks, tables, web forms, inserting images.	03 Hours
Cascading style sheet (CSS) : Concept of CSS, creating style sheet, Importing style sheets, CSS properties, CSS styling (background, text format, controlling fonts), CSS rules, Style Types, CSS Selectors, working with block elements and objects, working with lists and tables, CSS id and class, box model.	03 Hours
Basics of JavaScript : Document object model, data types and variables, functions, methods and events, controlling program flow, built-in objects and operators, validations.	02 Hours

Pedagogy:	PowerPoint presentations, Practical Assignments
References/ Readings:	<ul style="list-style-type: none"> a) Nigel Chapman, Jenny Chapman; Digital Multimedia; Wiley India Edition, 2nd Edition b) Roger Parker; One-Minute Designer; Hungry Minds Inc, U.S.; 2nd edition c) Ranjan Parekh, " Principles of Multimedia", McGraw Hill Education; 2 edition d) Tay Vaughan, "Multimedia Making It Work"; Mc Graw Hill, Eighth Edition. e) Laura Lemay , Rafe Colburn , Jennifer Kyrnin, "Mastering HTML, CSS & JavaScript Web Publishing", BPB Publications f) Alex Libby, Gaurav Gupta, Asoj Talesra , "Responsive Web Design with HTML5 and CSS3 Essentials", PACKT Publishing
Course Outcomes:	<p>On successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Create and edit images, audio and video 2. Build websites using the elements of HTML. 3. Build interactive and stylish websites using the client-side programming techniques with CSS and JavaScript. 4. Learn to validate client-side data. 5. Define the structure and contents of the website using different features of CSS

Suggested Practical List: (60 Hours)

Multimedia

- i. Image compositing : Remove background and combine images to create a work of art. (GIMP)
- ii. Learn to create images for Print, Web and Video
- iii. Design a Logo for a company
- iv. Design a Brochure for given Product and details. Learn about different file formats(SCRIBUS)
- v. Design a poster with given information and learn about image compression(SCRIBUS)
- vi. Edit the sound file and Learn about Effects and Filters of sound.(AUDACITY)
- vii. Record your voice and learn about Audio Compression(AUDACITY)
- viii. Learn Audio mixing and streaming of audio content(AUDACITY)
- ix. Learn about Video editing – Prepare video with rough cut.(WINDOWS MOVIE MAKER)
- x. Prepare video content with title and special effects. (WINDOWS MOVIE MAKER)
- xi. Record video content and learn about video compressions. (WINDOWS MOVIE MAKER)
- xii. Prepare Video content for vimeo / youtube. (WINDOWS MOVIE MAKER)

Note : Practical can be done using GIMP, Inkscape, Scribus, Blender, Audacity, Lightworks / Kdenlive

Web Design

HTML

- i. Create a basic HTML document structure with the appropriate doctype, <html>, <head>, and <body> elements.
- ii. Add a heading (<h1>) and a paragraph (<p>) to your HTML document.
- iii. Create a hyperlink (<a>) that navigates to another web page when clicked.
- iv. Insert an image () into your HTML document and provide an appropriate alt text.
- v. Construct an ordered list () with three list items ().
- vi. Design a table (<table>) with two columns and two rows, containing relevant data.
- vii. Design table using colspan, rowspan
- viii. Build a simple form (<form>) with text input fields (<input type="text">) for name and email.
- ix. Implement a checkbox (<input type="checkbox">) and a radio button (<input type="radio">), lists within a form.
- x. Create a navigation menu using semantic HTML tags such as <header>, <nav>, and .
- xi. Embed an audio or video file (<audio> or <video>) into your HTML document.

CSS

Write CSS to ,

- i. Apply inline styles to a paragraph (<p>) to change its color and font size.
- ii. Link an external CSS file to your HTML document using the <link> tag.
- iii. Change the colour of text using CSS
- iv. Change the font family and font size of text using CSS
- v. Add a background color to an element using CSS
- vi. Add padding and margin to elements using CSS
- vii. Align text and elements using CSS properties
- viii. Change the border color, width, and style of an element using CSS
- ix. Style hyperlinks using CSS
- x. Apply styles to specific elements using class selectors in CSS
- xi. Create and style lists using CSS
- xii. Change the display and visibility of elements using CSS
- xiii. Control the size and position of elements using CSS properties
- xiv. Add shadows and gradients to elements using CSS
- xv. Apply styles to images using CSS
- xvi. Create and style basic CSS animations and transitions
- xvii. Override CSS styles using inline styles
- xviii. Include and use external CSS stylesheets in HTML documents
- xix. Use CSS pseudo-classes to style elements based on their state
- xx. Create and style basic CSS layouts using floats and clear properties
- xxi. Style form elements, such as input fields and buttons, using CSS

Bootstrap

- i. Include Bootstrap in an HTML document using CDN , local files
- ii. Create a responsive grid layout using Bootstrap's grid system
- iii. Create and style navigation menus using Bootstrap's navbar component
- iv. Create and style buttons using Bootstrap's button classes
- v. Incorporate and style Bootstrap's predefined CSS classes for typography
- vi. Create and style forms using Bootstrap's form components
- vii. Create and style responsive images using Bootstrap's responsive image classes
- viii. Incorporate and style Bootstrap's modal dialogs
- ix. Use Bootstrap's responsive utilities to control visibility and alignment
- x.

JavaScript

- i. Validate a user's input in a form using JavaScript
- ii. Write a JavaScript function that reverses a given string.
- iii. Implement a slideshow or image carousel using JavaScript.
- iv. Write a JavaScript program that finds the largest number in an array.
- v. Detect and handle browser events like clicks or keyboard input using JavaScript.
- vi. Write a JavaScript function that calculates the factorial of a given number.
- vii. use JavaScript to manipulate the CSS properties of an HTML element dynamically.

Note : Web design Practical can be done using VS code IDE

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-143

Title of the Course: Data analytics using Spreadsheets I

Number of Credits: 03 (1 T + 2 P)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	Introduce the basic concepts of data analytics; develop proficiency in students in using spreadsheets to format data, manipulate data using appropriate basic function and formulas; visualize data; filter data and generate basic reports using Pivot tables.	
Content	Theory	No of hours
	Unit I: Introduction to Data Analytics and Spreadsheet Basics Introduction to Data Analytics using spreadsheet <ul style="list-style-type: none">● Definition of Data Analysis and Data Analytics● Phases of Data Analysis● Methods of Data Analysis in Spreadsheets● Understanding Data: Data and types of data● Quantitative data – discrete data, continuous data● Qualitative data - categorical data, ordinal data.● Understanding operators and functions essential for data analytics.● Arithmetic operators and order of operations.● Functions: Parts of a function, arguments to a function, function library and types of functions.	5 hours
	Unit II: Data Collection and Manipulation. Data Collection using online data collection tools. Creating Spreadsheets online and collaboration. Introduction to data cleansing, data modification using data analysis functions. Sorting criteria and types of sorting, Filters and types of filters, Guidelines and examples for sorting and filtering data by colour: Overview of sorting and filtering data by colour and icon set, using colour effectively when analysing data, choosing the best colours.	5 hours
	Unit III: Data Visualization and Summarization Visualizing data: Principles of charting, types of basic charts, Some practicalities in preparing charts. Conditional Formatting and its types. Functions used for data summarization. Pivot tables and its applications.	5 hours
Content	Practical	

	<p>Unit I: Spreadsheet Basics:</p> <ul style="list-style-type: none"> ● Formatting Cells with font formats, alignment, borders etc. ● Number formats, currency formats, formatting dates, custom and special formats. ● Format painter ● Selection techniques ● Advanced paste special techniques: paste value, paste formulas, paste formats, paste validations, transpose tables ● Formulas and Functions: ● Complex Formulas with arithmetic operators ● Relative, mixed and absolute cell reference ● Basic Functions such as sum, average, max, min, count, counta. ● Customization, Formatting and Protection: ● Customizing the ribbon, Using and customizing autocorrect ● Changing Excel default options ● Page Layout and printing options: Setting up print area, customizing headers and footer, print titles. ● File level protection, workbook, worksheet protection ● Working with named ranges, ● Commonly used shortcut keys <p>Essential Data Analysis Functions and Methods:</p> <ul style="list-style-type: none"> ● Text Functions: Upper, Lower, Proper, Left, Mid, Right, Trim, Len, Exact, Concatenate, Find, Search, Substitute ● Date and time Functions: today, now, day, month, year, date, date if, dateadd, EOMonth, weekday, days, networkdays ● Logical functions: TRUE, FALSE, IF, AND, OR ● Nested if, IF function together with AND, OR function ● Data cleaning and preparation using text functions and text to column. 	20 hours
	<p>Unit II Data collection using online data collection tools such as Google Forms:</p> <ul style="list-style-type: none"> ● Creating data forms to collect data for different types of scenarios such as surveys, event registration, feedback etc. ● Creating forms with conditional data input workflows based on user choice. ● Online storage of spreadsheets: ● Creating online spreadsheets such as google sheets and online collaboration of the same. ● Working with multiple worksheets & spreadsheets: ● Scenarios which require creating a workbook with multiple sheets and cross referencing. ● Scenarios which require creating multiple workbooks with multiple sheets and cross referencing across workbooks. ● Methods used in data analytics: ● Freezing Rows and Columns ● Sorting Data ● Filtering Data ● Summarizing Data ● Formatting Data as Table 	20 hours

	<p>Unit III Data Analytics Methods:</p> <ul style="list-style-type: none"> ● Visualizing data with charts. ● Adding Conditional Formatting. ● Essential advanced Data Analysis Functions: sumif, sumifs, countif, countifs, averageif, averageifs, nested if, iferror statement, and, or, not ● Introduction to simple pivot tables. ● Solving real life problems/scenarios in spreadsheets. 	20 hours
<p>Pedagogy:</p>	<ul style="list-style-type: none"> ● Blended learning: Concept learning through Lab assignments and online video resources followed by application of concept learnt to real life scenario provided. ● Practical skill development through Lab assignments. 	
<p>References/ Readings:</p>	<p>M. Alexander, D. Kusleika, Excel 2019 Bible. Indiana: Wiley, 2019. D. Whigham, Business Data Analysis using Excel. New York: Oxford University Press, 2007 https://edu.gcfglobal.org/en/topics/excel/#</p>	
<p>Course Outcomes:</p>	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Format a given spreadsheet with various formatting features and use appropriate functions given relevant description of desired output. 2. Sort, filter, summarize data given in a spreadsheet as per given instructions 3. Visualize data using appropriate charts and conditional formatting. 4. Solve basic queries on a given data set by preparing basic pivot tables for a given data set. 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-144

Title of the Course: Desktop Publishing

Number of Credits: 3 (1 T + 2 P)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To introduce the basic concepts of Desktop Publishing and Page Layout. To develop skills and competencies in image editing. To acquire and develop skills for Digital Content Creation for various platforms.	
Content:		No of hours
	1. Introduction <ul style="list-style-type: none">● Definition of Desktop Publishing and Digital Publishing● Introduction to open source and proprietary software used in DTP● Print Media v/s Digital Media● Benefits of Desktop and Digital Publishing● Examples of Desktop Publishing and Digital Publishing● Digital Publishing Platforms● Branding and Identity	03 hours
	2. Typography and Color <ul style="list-style-type: none">● Definition of Typography; Common Types of Fonts; Choosing a Font; Kerning, Leading and Tracking● Color Basics; Hue, Saturation and Value; Color Wheel	04 hours
	3. Layout and Design <ul style="list-style-type: none">● Basics of page layout; page layout in pictures measurement units like inch, pica and points; features of good typography; Serif and sans serif fonts.● Basic design principles: Proximity, White Space, Alignment, Contrast and Repetition● Fundamentals of Design: Line, Shape, Forms, Texture and Balance	04 hours
	4. Images <ul style="list-style-type: none">● Graphics: Raster v/s Vector● Lossy v/s Lossless Compression● Common Image Formats● Image Manipulation Techniques● Image Usage Rights	04 hours
Pedagogy:	Practical assignments using open source software/platforms such as Gimp, Canva	

References/ Readings:	<p>1: Nigel Chapman, Jenny Chapman; Desktop Multimedia; Wiley India Edition, 2nd Edition</p> <ul style="list-style-type: none"> ● https://edu.gcfglobal.org/en/beginning-graphic-design/ ● https://www.copypress.com/kb/content-marketing/everything-you-need-to-know-about-digital-publishing/ ● https://www.stateofdigitalpublishing.com/digital-publishing/what-is-digital-publishing/ ● https://www.nxtbookmedia.com/blog/everything-you-need-to-know-about-digital-publishing/ ● https://www.gimp.org/tutorials/ ● https://www.canva.com/
Course Outcomes:	<p>At the completion of this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Explain the basic concepts of Desktop Publishing and its relevance in e-content development. 2. Apply typographic and color schemes used for the layout and designing e-content. 3. Apply the editing features for given images. 4. Develop e-content for a given product for various platforms
<p>.Suggested Practical List: 60 Hours (at least 10-12 Practicals from the following)</p> <ol style="list-style-type: none"> 1. Image Editing and Graphic Manipulation <ol style="list-style-type: none"> a. Basic Transformation Tools b. Enhancing images (contrast and brightness changes) c. Image compression using different file formats d. Applying special effects and filters on images 2. To create a social media Post for any platform. 3. To create a social media Story for any platform. 4. To create Animated Social Media content such as Instagram Reels. 5. To create social media ads for any platform. 6. To design Covers for any social media platform. 7. To design a Logo for a given product. 8. To design a Poster with the given information. 9. To design a Flyer with the given information. 10. To design a Banner for a given product. 11. To design an Advertisement for a given brand. 12. To develop Infographics content on a given topic. 13. To design a Newsletter covering the given events for your department. 14. To design a Magazine Cover for your college. 15. To design a Brochure for a given product. 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-145

Title of the Course: Basic Computer Applications

Number of Credits: 3(1L+2P)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To Provide An Understanding Of Essentials Of InformationTechnology, InternetApplications and Emerging Technologies. Includes practical skills in datacapture,presentation,reportformatting,efficientsearchtechniquesandonlinecollaborationtools.	
Content:	Description	No.of hours
	Unit I: InformationTechnologyBasics Information : Prerequisites of Information, Need for Information Technology and its advantages;InformationTechnology:Definitionandcomponents;Data: Definition,Types,DataRepresentation,NumbersystemandCodingSchemes(ASCIIandUNICODE);PartsofaComputer: CPU, Memory, Input/Output Devices, Auxiliary Memory; Software– Definition,Relationship between Hardware and Software, Categories of Software, OS - definition & functionsRoleofInformationTechnologyin:Business,MobileComputing,HealthServices,PublicSector,Media, DefenseServices, EducationandPublication.	10 hours
	Unit II: InternetApplicationsandEmergingTechnologies Internet – role and importance, Web Browser, IP Addressing– Public Vs Private, Static VsDynamic;WWW&relatedprotocols; InternetApplications. Cloud Computing: Meaning, Features, & Service models, Advantages and disadvantages, Mobile Computing: Meaning, Business Applications ofMobile computing, Virtual reality & Augmented Reality: Meaning and applications, IoT -InternetofThings: Meaning& Applications.	5 hours
	Practicals	

Lab1	<p>Basic Computer Skills Surfing the Internet, Use of Email and Search Engines Securing your device Installation and Configuration of any free Antivirus Package eg. AVG/Avast etc., Online Sharing and Collaboration Create documents, spreadsheets and presentations online, Share and collaborate in real time, Safely store and organize your work, Control who can see your documents Data capture using Google Forms Create data forms to capture data for Event Registration, Event Feedback, Customer feedback/satisfaction on a product or service and Order Request OS Basic Installation of Operating System, Demonstrate features of any MS Windows based OS or any of the Linux flavor , Identification of Directories , Setting up computer, Add a printer, Check device drivers, Installation of software, Users and administrative rights for installation</p>	10 hours
Lab2	<p>Report Formatting using Word Processing (MS Word or any similar Open Source software) Draft an official letter for job interview invitation/ job appointment/ invitation to a business trade show event, use mail merge to input the recipients list linking with database. Given a project report in PDF format transfer to word processor software and format to include title page, specified Paragraph and Page Formating (page size, orientation, line spacing, font type and font size, Indent, bullets, paragraph formatting) details, Acknowledgement page, Table of contents page, List of figures page, List of Tables page, bibliography, references, distinct headers for each chapter, page numbering in roman for initial pages and normal from first chapter. The document should be checked for spelling errors and corrected appropriately. Create / Upload a document in a collaboration software like Google docs. Share and collaborate in real time, Safely store and organize your work, Control who can see your documents.</p>	30 hours
Lab3	<p>Presentation Software (MS- Powerpoint or any similar Open Source software) Preparing presentation in areas such as Customer satisfaction/ feedback, product analysis, job satisfaction using the data obtained through data capture tool, including appropriate slide animation, sound recording, slide timings, customer feedback video. Export the presentation as video or save as slide show. Prepare handouts for audience.</p>	20 hours
Pedagogy:	MS-Word, MS-Powerpoint or any similar open source software may be used	

References/ Readings:	<ol style="list-style-type: none"> 1. Pradeep K. Sinha and PritiSinha(2022), Computer Fundamentals, BPB Publications 2. ITL Education Solutions Limited(2005), Introduction to Information Technology, Pearson Education 3. M.C.ArvindBabu,Dr. S. Anandamurugan, T.Priyaa(2016), Cloud Computing (First Edition),Laxmi Publications Pvt Ltd 4. ArshdeepBahga, Vijay Madiseti (2014)Internet of Things: A Hands-On Approach, Vijay Madiseti Publications 5. https://www.howstuffworks.com 6. https://www.panola.edu/media/825/download?attachment/itsw1401.pdf
Course Outcomes:	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Explain the basic Knowledge and Understanding of Information Technology, Internet Applications and Emerging Technologies. 2. Develop practical skills in Application software. 3. Acquire future technologies through foundational skills learnt. 4. Pursue advanced knowledge and professional development in IT.

Name of the Programme: Bachelor of Science in Computer Science (Honours)**Course Code: CSC-146****Title of the course: Basics of Python Programming****Number of Credits:3 (1T+2P)****Effective from AY:2023-24**

Pre-requisites for the Course	Basic working knowledge of Computers and Internet	
Course Objectives:	1. To introduce programming concepts using Python. 2. To introduce object oriented programming concepts.	
Content:	(Theory) 1. Python Interpreter, Python Shell, strings, relational operators, logical operators, precedence of operators, bitwise operators, variables and assignment statements, script mode, functions, modules, command line arguments, control structures- if conditional statements, iteration for and while statements, break, continue and pass statements. 2. Data types- Boolean, numbers, coercing integers to floats and vice versa, numerical operations, lists, creating a list, slicing a list, adding and removing items from a list, searching for values in a list, tuples, immutability property, converting tuples into a list, sets, set operations, dictionaries, strings, Unicode, formatting strings, docString, modules, packages, scope, recursion 3. Object Oriented Concepts- Classes, Objects, Abstract Data types, polymorphism, encapsulation, modifier, accessor methods, static method, adding methods dynamically, composition, inheritance, built-in functions for classes. 4. Files, Exceptions 5. Applications of Python - use of Python libraries such as Matplotlib, Pandas, using databases with python, collecting information from Twitter etc. (at least three applications to be covered).	No.of hours 4 4 4 2 1

(Practicals)

(15x4=60hrs)

List of Practical : (at least 8 practicals from the following)

- 1) a) Write a function that returns the sum of digits of a number, passed to it as an argument.
- b) Write a function that returns True or False depending on whether the given number is a palindrome.
- c) Take the radius of a circle as input from the user, pass it to another function that computes the area and the circumference of the circle and displays the values.
- d) Write a function that finds the sum of the n terms of the following series:
$$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots + \frac{x^n}{n!}$$
- 2) Perform the following actions on a list :
 - a) Print the even-valued elements
 - b) Print the odd-valued elements
 - c) Calculate and print the sum and average of the elements of the array
 - d) Print the maximum and minimum element of the array.
 - e) Remove the duplicates from the array
 - f) Print the array in reverse order
- 3) a) Define a function which can generate and print a list where the values are squares of numbers between 1 and 20 (both included). Then the function needs to print all values except the first 5 elements in the list.
- b) Write a program which takes 2 digits, X, Y as input and generates a 2-dimensional array. The element value in the i-th row and j-th column of the array should be $i*j$.
- 4) a) Write a program that accepts a sequence of lines as input and prints the lines after making all characters in the sentence capitalized.
- b) Write a program that accepts a sentence and calculates the number of letters and digits.
- c) Given an array of integers, find two numbers such that they add up to a specific target number.
- 5) a) Write a function that takes a list of values as input parameter and returns another list without any duplicates.
- b) Write a program that takes a sentence as input from the user and computes the frequency of each letter. Use a dictionary to maintain the count.
- 6) a) Write a recursive function that multiplies two positive numbers a and b and returns the result. Multiplication is to be achieved as $a+a+a$ (b times).
- b) Write a recursive function that inserts the element x at every n-th position in the given list and returns the modified list.
- 7) a) Given a list of strings, return the count of the number of strings where the string length is 2 or more and the first and last characters of the string are the same.
- b) Given a list of strings, return a list with the strings in sorted order, except group all the strings that begin with 'x' first. e.g. ['mix', 'xyz', 'apple', 'xanadu', 'aardvark'] yields ['xanadu', 'xyz', 'aardvark', 'apple', 'mix']

8) Define a class Student that keeps track of academic record of students in a school. The class should contain the following data members:

- rollnum - roll number of the student
- name - name of the student
- marksList - List of marks in 5 subjects
- stream - A: Arts, C: Commerce, S: Science
- percentage - percentage computed using marks
- grade - grade in each subject computed using marks
- division - division computed on the basis of overall percentage

The class should support the following methods:

- a. `__init__` for initializing the data members
- b. `setMarks` to take marks for five subjects as an input from the user
- c. `getStream` for accessing the stream of the student.
- d. `Percentage` for computing the overall percentage of for the student.
- e. `gradeGen` that generates grades for each student in each course on the basis of marks.

Marks	Grade
≥ 90	A
< 90 and ≥ 80	B
< 80 and ≥ 65	C
< 65 and ≥ 40	D
< 40	E

f. `division` for computing division on the basis of the following criteria based on overall percentage of marks scored:

Percentage	Division
≥ 60	I
< 60 and ≥ 50	II
< 50 and ≥ 35	III

g. `__str__` that displays student information.

9) Define a base class Vehicle , having attributes registration number, make, model and color. Also, define classes Passenger Vehicle and Commercial Vehicle that derive the class Vehicle. The Passenger Vehicle class should have additional attribute for maximum passenger capacity. The Commercial Vehicle class should have an additional attribute for maximum load capacity. Define `__init__` method for all these classes. Also, get and set methods to retrieve and set the value of the data attributes.

10) Define classes Car, Autorickshaw and Bus which derive from the Passenger Vehicle class mentioned in the previous question. The Car and Bus should have attributes for storing information about the number of doors, not shared by Autorickshaw. The Bus should have Boolean attribute `doubleDecker` not shared by Car and Autorickshaw. Define `__init__` method for all these classes. Also define get and set methods to determine and set the value of the day attributes.

11) Develop a program to sort the employee data on the basis of pay of the employees using i) selection sort ii) bubble sort. iii) insertion sort. Consider a list L containing objects of class Employee having `empNum`, `name` and `salary`.

12) Write a function that takes two file names, `file1` and `file2` as input. The function should read the contents of the file `file1` line by line and should write them to another file `file2` after adding a newline at the end of each line.

13) Write a function that reads a file `file1` and displays the number of words and the number of vowels in the file.

	<p>14) Write a function that reads the contents of the file Peom.txt and counts the number of alphabets, blank spaces, lowercase letters and uppercase letters, the number of words starting with a vowel and the number of occurrences of word —beautifull in the file.</p> <p>15) Write a function that takes two files of equal size as an input from the user. The first file contains weights of items and the second file contains corresponding prices. Create another file that should contain price per unit weight for each item.</p> <p>Note : Testing and Debugging tools to be used during the practical sessions.</p>
Pedagogy:	<ul style="list-style-type: none"> ● Powerpoint presentations ● Group Discussions
References/ Readings:	<p>Text book :</p> <p>1) Taneja Sheetal, Kumar Naveen, —Python Programming - A modular approachll, Pearson</p> <p>Reference book:</p> <p>1) Guttag John V., —Introduction to Computation and Programming using Pythonll, MIT Press, 2nd Edition.</p>
Course Outcomes:	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1) Use the basic programming syntax with Python programming language, Python Interpreter and Command Line Arguments. 2) Describe the data types, various Control Structures, Packages, Recursion and File Handling concepts available in Python. 3) Explain and use Object Oriented Programming (OOPs) Concept and its features. 4) Develop simple Python Applications using various Python Libraries.

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-147

Title of the Course: Graphical User Interface Design

Number of Credits: 03 (1 T + 2 P)

Effective from AY: 2023-24

Pre-requisites for the Course:	None	
Course Objectives:	This course is aims to: <ul style="list-style-type: none">- teach basic concepts of interface design.- train to create interface prototypes to test usability.- explain user personas and experiences.- teach to create user engaging interfaces	
Content:		Total Contact hours: 15 Hours
	I.Introduction to UI/UX UI and UX An overview of the user interface's history User experience (UX) Similarities and Differences between UX and UI The job of the user experience designer The UI designer's job description	01 hour
	II.User Persona for UX Design User Flow in UX Design User flow in UX Tools to make a user experience flow UX Design Prototypes Creating a user experience prototype Test designs prototypes Wireframes in UX Design Benefits and use of wireframes	02 hours
	III.Basic visual design principles in UI Design Creating attractive and functional interfaces Definition of Design thinking Design Thinking Phases The Science of Creativity in the Brain Advantages of intuition Importance of Intuitive Design Advantages and disadvantages of intuitive design Characteristics and Benefits of Using User-Friendly Software	03 hours
	IV. Common tools for UI Designs Using Balsamiq Wireframes Creating Wireframes with Axure Use Axure RP to Create Wireframes Tips to achieve a good user interface and Experience	03 hours

	V. Understanding what Typography is Understanding typefaces, fonts, and font selection Obey the laws of typography A glossary of typographic terms	02 hours
	VI. Way to test contrast in UI design Design alignment Significance of alignment in design Visual Hierarchy's Building Blocks Creating an Effective Visual Hierarchy UI and its relation with readability Advice on Improving Readability and Legibility	02 hours
	VII. Font pairing Basics of Font Pairing Adding Meta information in UI/UX design SEO and UI Design Responsive Website Design SEO and UX Design	02 hours
Pedagogy:	<ul style="list-style-type: none"> ● Lectures to be conducted using computer and projector ● Hands on practice of all concepts covered in theory sessions 	
References/ Readings:	Textbooks: 1) Modular Design Frameworks : A Projects-based Guide for UI/UX Designers, Cabrera & James 2) UX for Developers: How to Integrate User-Centered Design Principles Into Your Day-to-Day Development Work, Westley Knight 3) UX for Lean Startups: Faster, Smarter User Experience Research and Design, Laura Klein 4) Smashing UX Design: Foundations for Designing Online User Experiences, Jesmond Allen & James Chudley 5) UX Fundamentals for Non-UX Professionals: User Experience Principles for Managers, Writers, Edward Stull	
Course Outcomes:	At the end of the Course, learner will be able to : <ul style="list-style-type: none"> - Explain the principles and concepts of Interface design - Create intuitive interfaces - Explain UX - Create better interfaces for effective UX 	

Practical Work

Sr. No	Topic	Total Hours :60
1	Exercises to Identify interface connectivity and establish interface connectivity between two different program modules. <ul style="list-style-type: none"> ● Choose any of the programming languages (like HTML, JavaScript, Bootstrap etc.), do create two separate programming files and establish the interface connectivity between both. 	08 hours

2	<p>Exercises that will facilitate Understanding frontend and backend interface and implementation of both interfacing.</p> <ul style="list-style-type: none"> ● Front –end and back-end interfacing languages used for interface design. ● HTML: HTML stands for Hypertext Markup Language. It is used to design the front-end portion of web pages using a markup language. 	16 hours
3	<p>Exercises to create wireframes designs:-</p> <ul style="list-style-type: none"> ● Modelling wireframes designs ● Implementing wireframes 	14 hours
4	<p>Exercises using font, color matching and typography:-</p> <ul style="list-style-type: none"> ● Use of colors and contrasts ● Font suitability ● Matching content to target users 	10 hours
5	<p>Exercises using responsive design on :-</p> <ul style="list-style-type: none"> ● Web pages ● Desktop software screens ● Smartphones/ Tabs and other handheld devices 	12 hours

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-148

Title of the Course: Data analytics using Spreadsheets II

Number of Credits: 03 (1 T + 2 P)

Effective from AY: 2023-24

Pre-requisites for the Course:	Basic knowledge of Spreadsheets.	
Course Objectives:	Develop ability to use spreadsheets for conditional data summarization, financial calculations, advanced data visualization. Work with pivot tables and charts to obtain insights, use lookup functions for data manipulation, perform what-if analysis. Create a dashboard in Excel. Obtain basic descriptive statistics using analysis tools.	
Content:	Theory	No of hours
	Unit I : Financial Data Analysis and Advanced data Visualization: Data Analysis financial functions <ul style="list-style-type: none">Financial arithmetic basics and Investment Appraisal functions- modeling financial data in Spreadsheets. Data Analytics advanced visualization methods <ul style="list-style-type: none">Data Visualization with charts such as tree map, waterfall, sunburst, box and whisker, power maps.	5
	Unit II: Steps in data analytics: <ul style="list-style-type: none">Preparation of data: Data collection, data cleansing and data validationElementary data modeling – linear functions in business, expressions and functions involving logical tests, vertical lookup functions, combining conditional statements with lookup functions.	5
	Unit III: Statistical analysis of data using Spreadsheets: <ul style="list-style-type: none">Collating and categorizing data, data description-central tendency and dispersion, descriptive statistics using Analysis Tool Pak.	5
	Practical	
	Unit I:Data Analysis advanced functions and methods <ul style="list-style-type: none">Financial Functions: FV, PV, NPV, IRR, PMT (loan amortization schedule)Scenarios for visualizing data using charts such as tree map, waterfall, sunburst, box and whisker, combo charts, power maps and 3D MapsAdvanced Sorting option and Advanced Filters	20

	<p>Unit II</p> <ul style="list-style-type: none"> ● Data Validation: Number, Date and Time Validation, Text and List Validation, Custom validation based on formula for a cell, Dynamic dropdown list creation using data validation-dependency list. ● What-if Analysis: Goal Seek, scenario analysis, data tables using PMT function, Solver tool ● Lookup Functions: Vlookup and Hlookup functions, Index and Match, Reverse Lookup using choose function. 	20
	<p>Unit III</p> <ul style="list-style-type: none"> ● Pivot Tables and Pivot Charts: Creating advanced pivot tables with advanced value field settings, filtering pivot tables, modifying pivot table data, grouping based, Pivot Charts and Slicers. Filter data with slicers, manage primary and secondary axis ● Creating Interactive Dashboard: Planning a Dashboard, Adding Tables and charts to dashboard, adding dynamic content to dashboard. ● Descriptive statistics using Analysis ToolPak. ● Introduction to Excel macros and VBA Basics. 	20
Pedagogy:	<p>· Blended learning: Concept learning through Lab assignments and online video resources followed by application of concept learnt to real life scenario provided. Practical skill development through Lab assignments.</p>	
References/ Readings:	<p>M. Alexander, D. Kusleika, Excel 2019 Bible. Indiana: Wiley, 2019. D. Whigham, Business Data Analysis using Excel. New York: Oxford University Press, 2007 How to use excel by Kevin Stratvert https://www.youtube.com/playlist?list=PLIKpQrBME6xLYoubjOqowzcCCd0ivQVLY</p>	
Course Outcomes:	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Use conditional arithmetic functions to summarize data and use financial functions, given a spreadsheet with data and relevant description of desired output. 2. Perform what-if analysis and data validation on given data for a given scenario. 3. Summarize and analyze data using Pivot Tables and Pivot Charts. 4. Present and visualize data using Dashboard for given data and given scenarios. 5. Obtain descriptive statistics for given data using Analysis ToolPak. 	

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-149

Title of the Course: Data and Business Analytics

Number of Credits: 3(1L+2P)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To understand data processing, data analysis, business analytics concepts, computer networking basics, e-commerce technology and business applications; To develop practical skills in data analytics and business analytics.	
Content:	Description	No of hours
	Unit I: Data processing, Data Analysis and Business Analytics Data Processing – Steps involved in data processing, advantages of computers in data processing Data analysis and forecasting - importance of data analysis in business, Data forecasting, its need, benefits of data forecasting, Data Integration: concept and how it works Introduction to Business analytics – meaning and basic concepts, Visualization/ Data Issues: Organization/sources of data, Importance of data quality, Dealing with missing or incomplete data, Data Classification	4
	Unit II: E-Commerce Definition, E-commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce, Types of E-commerce: Business to Business E-Commerce, Business to Consumer E-Commerce, Consumer to Consumer, Government to Consumer, Business to Government, Electronic Payment Systems: Smart Cards – Credit Cards – Wallets, Safe practices, Risks, E-Retail, Concept and Examples, Online shopping – Introduction, Safety measures (Encryption of data authentication, SSL, Digital signatures, Digital Certificates), E-Banking, Features and services, M-Commerce, Products and services	5
	Unit III : Basics of Computer Networking Networking basics, Need for computer networks, Types of networks-LAN, MAN, WAN, Network Components – H/W, Software, Communication channels, Network Devices, Network topologies.	6
	Practicals	

Lab1	<p>Spreadsheet (MS-Excel or any similar open source software)</p> <ul style="list-style-type: none"> ● Working with worksheets -Entering data, Formatting, Editing, and Printing a worksheet, ● Formulas and Functions in Excel, operators in formula ● Generally used Spreadsheet functions - Mathematical, Statistical, Financial, Logical, Date and Time, Database and Text functions ● Introduction to some more useful functions such as the IF, nested IF, VLOOKUP and HLOOKUP ● Data Sorting and Filtering ● Result representation of data using spreadsheet ● What-if analysis, Logical tests(nested if functions), Goal seek, ● Representing results graphically ● Filtering, advanced filters, sorting and conditional formatting data ● Data validation techniques, Hyperlinks ● Pivot table, Scenarios ● Summing through the sheets ● Getting external data files into Excel ● Macros - creation, editing and deletion of macros <p>Assignments to be given on the following topics: to prepare and analyse Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression</p>	36
Lab2	<p>Data Analytics</p> <ul style="list-style-type: none"> ● Assignments to analyse data available from IndiaStat.com such as Analysis of demographic data, environment data, public expenditure ● Analyse data from annual reports of Companies and banks 	8
Lab3	<p>E-commerce Website review</p> <p>Write a review of an E-Commerce Site visited include: Site description, Site Design, ease in navigation , process for purchasing items, security, privacy, customer service, best features of site, Target Audience, Revenue model, Marketing Strategies</p>	8
Lab4	<p>Computer Networking</p> <p>Basic Networking Setup of PC, Network commands like ipconfig, ping, traceroute, nslookup etc, Setup of Home Router / Wifi Hotspot, Understanding of Firewall and Basic Firewall Setup, File and Printer Sharing, connecting to share, Finding out public address, connection speeds etc.</p>	8
Pedagogy:	MS-Excel or any similar open source software may be used Field visits may be conducted to banks, corporate offices employing relevant software for business applications.	

<p>References/ Readings:</p>	<ol style="list-style-type: none"> 1. ITL Education Solutions Limited(2005), Introduction to Information Technology, Pearson Education 2. Ravi Kalakota& Andrew B. Whinston(2009), Frontiers of Electronic Commerce (Ninth Impression) , Pearson Education. 3. David Whiteley(2000),E-Commerce: Strategy, Technologies And Applications McGraw-Hill Education, ISBN-10 : 0077095529 4. Thomas H. Davenport, Jeanne G. Harris(2010), Competing on Analytics- The New Science of Winning , Harvard Business Review Press. 5. LaValle et al.(2005), Analytics: The New Path to Value, Taxmann Publishers. 6. Davenport and Harris(2007), The Dark Side of Customer Analytics, Harvard Business Review Press. 7. Bartlett, R.(2013) , A Practitioner’s Guide to Business Analytics. McGraw-Hill, New York. 8. Bruce Schneier, Applied Cryptography-Protocols, Algorithms and Source code in C (Second Edition), , Wiley India Pvt Ltd, ISBN 978-81-265-1368-0 9. https://www.analyticsvidhya.com/blog/2021/11/a-comprehensive-guide-on-microsoft-excel-for-data-analysis/ 10. https://www.tutorialspoint.com/excel_data_analysis/excel_data_analysis_tutorial.pdf
<p>Course Outcomes:</p>	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Explain the concepts of data processing, data analysis, business analytics, computer networking, e-commerce technology and its applications in business. 2. Develop skills of data analysis and business analytics using relevant Application software. 3. Apply the Spreadsheet tools to solve business problems. 4. Review an E-commerce Website

Name of the Programme: Bachelor of Science in Computer Science (Honours)

Course Code: CSC-150

Title of the Course: Database Management and Analysis

Number of Credits: 3 (1L+2P)

Effective from AY: 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	To familiarize the student with various applications of Information and Communication technologies in business and to familiarize with the mechanism for conducting business transactions through electronic means.	
Content:	Unit I : Database Management System <ul style="list-style-type: none">● Database Designs for Accounting and Business Applications: Reality- Expressing the Application; Creating Initial design in Entity Relationship(ER) Model; Transforming ER Model to Relational data model concepts; Implementing RDM design using an appropriate DBMS.● SQL and Retrieval of Information: Basic Queries in SQL; Embedded Queries in SQL; Insert, Delete and Update statements in SQL● DBMS Software: Environment; Tables; Forms; Queries; Reports; Modules;● Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, Managing the data records of Employees, Suppliers and Customers.	10 hours
	Unit II: Enterprise Resource Planning <ul style="list-style-type: none">● Introduction: Traditional information model, Introduction to an enterprise, What is ERP?, Reasons for growth of ERP market, Advantages and Disadvantages of ERP , Introduction to business modules: finance, manufacturing, Human resource, materials management, sales and distribution, Limitations of ERP, ERP and eCommerce	5 hours
	Practicals	
Lab1	Database Management System Creating Database and Tables, Changing Table Contents, Adding and Editing Records, Changing Table Properties, Creating Relationships between Tables, Importing and Exporting Data with other Programs. Creating Queries: Using the Query Window, Using Criteria and Saving Queries, Criteria Expressions and Operators, Changing a Query and Totaling, Creating a Query to the above-made Databases Creating Forms: Putting List Box on the Form, Selecting and Redesigning Labels and Data, Moving Label and Data, Adding Data and using Data Validation Creating Reports: Creating a single Column Report, Creating a Grouped Data Report, Adding Graphs to Reports. Use of Macros for search and navigation filters.	50 hours

Lab2	ERP Mini Project Case study – Studying ERP implementation in any business firm Report preparation and submission – report shall include ERP introduction, life cycle as followed by the Business firm under study – pre-evaluation screening, package evaluation, project planning phase, gap analysis, reengineering, configuration, implementation team training, testing, going live, end user training, post implementation.	10 hours
Pedagogy:	MS-Access or any similar open source software Field visits may be conducted to understand and demonstrate ERP Software.	
References/ Readings:	<ol style="list-style-type: none"> 1. Database systems – Bipin Desai 2. MS-Access manual 3. S Sadagopan, “ERP a Management Prospective” Tata McGraw Hill Publishing Company Limited, New Delhi 1999 4. Alexis Leon , “ERP Demystified”, Tata McGraw Hill Publishing Company Limited, New Delhi 2000 	
Course Outcomes:	<p>At the end of the course, learner will be able to:</p> <ol style="list-style-type: none"> 1. Describe database designing in DBMS software, Query language and understand its applications. 2. Creation and management of Database tables, queries, forms, reports and also macros in DBMS. 3. Explain the application of Enterprise Resource Planning in Business 4. Explain Implementation of ERP as a case study in any business firm. 	