Credit Framework for the Bachelor of Computer Applications (Cyber Security and Forensic)-NEP-2020
School of Computer Applications, BBD University, Lucknow

SEMESTER	Discipline Specific Core (DSC) (Major)	Discipline Specific Elective (DSE) (Major)	Generic Elective (GE) (Minor)	Co-Curricular (CC)	Vocational Course(VOC)	Survey/ Seminar/MOOC/Community Outreach (SSMC)	GP	Total Credit
1	4 Subjects 18 Credits (6+6+4+2 Credits)		1 Subject 4 Credits	1 Subject 3 Credits			1 Credit	26
2	4 Subjects 16 Credits (6+4+2+4 Credits)		1 Subject 4 Credits	1 Subject 3 Credits	1 Subject 2 Credits		1 Credit	26
Early Exit Option-1: Award of CERTIFICATE (After 1 Year: 52 Credits)								
3	4 Subjects 19 Credits (6+6+4+3 Credits)		1 Subject 4 Credits		1 Subject 2 Credits		1 Credit	26
4	3 Subjects 15 Credits (6+6+3 Credits)	1 Subjects 4 Credits	1 Subject 4 Credits		1 Subject 2 Credits		1 Credit	26
Early Exit Option-2: Award of DIPLOMA (After 2 Year: 104 Credits)								
5	3 Subjects 16 Credits (6+6+4 Credits)	2 Subjects 8 Credits (4+4 Credits)					1 Credit	25
6	1 Subject 4 Credit (Online Mode) Industrial Training Cum-Project 20 Credits						1 Credit	25
Early Exit Option-3: Award of Bachelor of Computer Applications (After 3 Year: 154 Credits)								
7	2 Subjects 12 Credits (6+6 Credits) Desertation-I 8 Credits	1 Subject 4 Credits					1 Credit	25
8	2 Subjects 10 Credits (6+4 Credits) Desertation-II 14 Credits						1 Credit	25
Award of Bachelor of Computer Applications With Research (After 4 Years: 204 Credits)								

Babu Banarasi Das University, Lucknow
School of Computer Applications
Bachelor of Computer Application (CS&F)
Evaluation Scheme (w. e. f. Academic Session 2023-24)

SEMESTER I

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN11101	Data Privacy Fundamentals	3	1	0	40	60	100	4	IBM
DSC	BCACSN11102	Fundamentals of Computer & Programming in 'C'	3	1	0	40	60	100	4	School
DSC	BCACSN11103	Web Designing	3	1	0	40	60	100	4	
DSC	BCACSN11104	Basic Mathematics	2	0	0	40	60	100	2	
GE		Generic Elective-I	3	1	0	40	60	100	4	
CC		Co-Curricular-I	2	1	0	40	60	100	3	
DSC	BCACSN11151	Programming in 'C' Lab	0	0	4	40	60	100	2	
DSC	BCACSN11152	Web Designing Lab	0	0	4	40	60	100	2	
	GPN1101	General Proficiency	0	0	0	100	0	100	1	
		Total	**16**	**5**	**8**	**420**	**480**	**900**	**26**	

SEMESTER II

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN12101	Cyber Security	3	1	0	40	60	100	4	IBM
DSC	BCACSN12102	Security Data Privacy Laws and Standards	2	0	0	40	60	100	2	IBM
DSC	BCACSN12103	Operating System	3	1	0	40	60	100	4	School
DSC	BCACSN12104	Basics of Python Programming	3	1	0	40	60	100	4	
GE		Generic Elective-II	3	1	0	40	60	100	4	
CC		Co-Curricular-II	3	0	0	40	60	100	3	
DSC	BCACSN12151	Basics of Python Programming Lab	0	0	4	40	60	100	2	
VC		Vocational Course-II	2	0	0	40	60	100	2	
	GPN1201	General Proficiency	0	0	0	100	0	100	1	
		Total	**19**	**4**	**4**	**420**	**480**	**900**	**26**	

Early Exit Option-1: Award of CERTIFICATE (After 1 Year: 52 Credits)

SEMESTER III

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN13201	Identity Access Management	3	1	0	40	60	100	4	IBM
DSC	BCACSN13202	Linux and Shell Programming	3	1	0	40	60	100	4	School
DSC	BCACSN13203	Computer Network Security	3	1	0	40	60	100	4	
DSC	BCACSN13204	Introduction to System Security	3	0	0	40	60	100	3	
GE		Generic Elective-III	3	1	0	40	60	100	4	
DSC	BCACSN13251	Network Programming Lab	0	0	4	40	60	100	2	
DSC	BCACSN13252	Linux and Shell Programming Lab	0	0	4	40	60	100	2	
VC		Vocational Course-III / SSMC	2	0	0	40	60	100	2	
	GPN1301	General Proficiency	0	0	0	100	0	100	1	
		Total	**17**	**4**	**8**	**420**	**480**	**900**	**26**	

SEMESTER IV

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN14201	Apply End to End Security to Cloud Application	3	0	0	40	60	100	3	IBM
DSC	BCACSN14202	Data Warehousing & Data Mining	3	1	0	40	60	100	4	School
DSC	BCACSN14203	Server Side Scripting	3	1	0	40	60	100	4	
GE		Generic Elective-IV	3	1	0	40	60	100	4	
DSE		Discipline Specific Elective-I	3	1	0	40	60	100	4	
DSC	BCACSN14251	Server Side Scripting Lab	0	0	4	40	60	100	2	
DSC	BCACSN14252	Data Warehousing & Data Mining Lab	0	0	4	40	60	100	2	
VC		Vocational Course-IV / SSMC	2	0	0	40	60	100	2	
	GPN1401	General Proficiency	0	0	0	100	0	100	1	
		Total	**17**	**4**	**8**	**420**	**480**	**900**	**26**	

Early Exit Option-2: Award of DIPLOMA (After 2 Year: 104 Credits)

SEMESTER V

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN15301	Deployment of Private Cloud	3	1	0	40	60	100	4	IBM
DSC	BCACSN15302	Mobile Application Development	3	1	0	40	60	100	4	School
DSC	BCACSN15303	Digital Image Processing	3	1	0	40	60	100	4	
DSE		Discipline Specific Elective-II	3	1	0	40	60	100	4	
DSE		Discipline Specific Elective-III	3	1	0	40	60	100	4	
DSC	BCACSN15351	Mobile Application Development Lab	0	0	4	40	60	100	2	
DSC	BCACSN15352	Digital Image Processing Lab	0	0	4	40	60	100	2	
	GPN1501	General Proficiency	0	0	0	100	0	100	1	
		Total	**15**	**5**	**8**	**380**	**420**	**800**	**25**	

SEMESTER VI

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN16301	Cyber Protection Practices (Online)	3	1	0	40	60	100	4	School
DSC	BCACSN16351	Industrial Training Cum-Project	0	0	0	240	360	600	20	
	GPN1601	General Proficiency	0	0	0	100	0	100	1	
		Total	**3**	**1**	**0**	**380**	**420**	**800**	**25**	

Early Exit Option-3: Award of Bachelor of Computer Applications (After 3 Year: 154 Credits)

SEMESTER VII

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN17401	Statistical & Optimization Techniques	3	1	0	40	60	100	4	School
DSC	BCACSN17402	Research Methodology	3	1	0	40	60	100	4	
DSC	BCACSN17403	Understanding Security & Forensics Through Case Stud	3	1	0	40	60	100	4	
DSE		Discipline Specific Elective-IV	3	1	0	40	60	100	4	
DSC	BCACSN17451	Statistical Package for Social Sciences(SPSS) Lab	0	0	4	40	60	100	2	
DSC	BCACSN17452	Dissertation-I	0	0	12	120	180	300	6	
	GPN1701	General Proficiency	0	0	0	100	0	100	1	
		Total	**12**	**4**	**16**	**420**	**480**	**900**	**25**	

SEMESTER VIII

Course Category	Course Code	Course Title	Period Per Week			Evaluation Scheme			Credits	Mode
			L	T	P	CIA	ESE	Total		
DSC	BCACSN18401	R Programming	3	1	0	40	60	100	4	
DSC	BCACSN18402	Intellectual Property Right	3	1	0	40	60	100	4	
DSC	BCACSN18451	R Programming Lab	0	0	4	40	60	100	2	School
DSC	BCACSN18452	Dissertation-II	0	0	28	200	300	500	14	
	GPN1801	General Proficiency	0	0	0	100	0	100	1	
Total			**6**	**2**	**32**	**420**	**480**	**900**	**25**	

Award of Bachelor of Computer Applications With Research (After 4 Years: 204 Credits)

DSC	Discipline Specific Core
DSE	Discipline Specific Elective
GE	Generic Elective
CC	Co-Curricular
VC	Vocational Course
GP	General Proficiency
L	Lecture
T	Tutorial
P	Practical

Generic Elective-I

1	BCACSN11111	Basics of Cyber Laws and Indian IT Act 2000
2	BCACSN11112	Basics of Cyber Security

Generic Elective-II

1	BCACSN12111	Digital Security and Forensic Fundamental
2	BCACSN12112	Forensic Incident Management

Generic Elective-III

1	BCACSN13211	Big Data Fundamentals
2	BCACSN13212	Emerging Technologies

Generic Elective-IV

1	BCACSN14211	Cloud Computing
2	BCACSN14212	Distributed Database Management

Discipline Specific Elective-I

1	BCACSN14221	Cyber Law & IT Act
2	BCACSN14222	Cryptography & Cyber Security
3	BCACSN14223	Data Communication and Network

Discipline Specific Elective-II

1	BCACSN15321	Biometric Security
2	BCACSN15322	Enterprise Architecture & Components
3	BCACSN15323	Physical Security

Discipline Specific Elective-III

1	BCACSN15324	Blockchain Technology
2	BCACSN15325	Internet of Things
3	BCACSN15326	Storage Area Network

Discipline Specific Elective-IV

1	BCACSN17421	Data Privacy & Fundamental
2	BCACSN17422	Soft Computing
3	BCACSN17423	Deep Learning

Note: 1. Student may select any subject from Co-Curricular list offered by the University

2. Student may selct any subject from Vocational Course list offered by the University

Bachelor of Computer Applications
(Cyber Security & Forensics)
In Collaboration with IBM

FIRST SEMESTER

Program	Bachelor of Computer Applications (CS & F)				
Year	I		Semester		I
Course Name	Data Privacy Fundamentals				
Code	BCACSN11101				
Course Type	DSC		L	T	P	Credit
Pre-Requisite		3	1	0	4
Course Objectives	Get an outline of data privacy laws and walk away with some guiding principles for how to stay out of trouble. Also Knowing how to hack a colleague's password will raise some ethical questions and review theories of data privacy as well as data privacy in the context of social media and artificial intelligence.				
Course Outcomes					
CO1	Identify foundational understanding of digital age privacy concepts and theories.				
CO2	Identify privacy implications of modern digital technology.				
CO3	Identify the rules and frameworks for data privacy in the age of technology.				
CO4	Learn the various data privacy acts and IT Acts				

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Privacy in the Digital Age:** An overview of privacy laws in Canada Case Study: Student loans data breach (Canada) - A breach involving the personal information of about more than half a million clients of Human Resources and Skills Development Canada (HRSDC) and 250 departmental employees. Information and foundational concepts of digital age privacy. You will see some of the history of it and consider the quandary that comes with trying to define privacy. Questions about the realities of securing personal data information will also be considered.	15	CO1
2	**Risks in Data Privacy:** An overview of the Personal Information Protection and Electronic Documents Act (PIPEDA) Case Study: Target Corp. (USA) - A data breach involving information on 40 million payment cards (i.e., credit, debit, and ATM cards) and personally identifiable information (PII) on 70 million customers Contemplate what threatens our privacy in this digital age and the steps we can we take to protect it. Also, we will take a deep look into the growing influence of smart devices and artificial intelligence and consider whether or not they help or hinder human beings.	15	CO2
3	**Frameworks of Data Privacy Law:** Dr. Ann Cavoukian's 7 Foundational Principles of 'Privacy by Design' Case Study: Think W3 (UK) - A data breach involving 1.2 million credit and debit card details Case Study: Doritex Corp. (USA) - A data breach exposed the social security numbers of over 500 job applicants Privacy and the law and how it pertains to privacy in the media, in surveillance situations and in protecting personal data information. Finally, we will see how privacy regimes are functioning outside of the United States and make comparisons on approaches to privacy and how it is regulated.	15	CO3
4	**Data breaches and passwords:** Case Study: Home Depot (USA) - A data breach estimated to have put payment card information at risk for approximately 56 million unique payment cards Class Participation Questionnaire	15	CO4

Suggested Readings

1. Data Privacy and GDPR Hank book

2. Privacy and Data Protection Essentials by Ruben Zeegers and Theo Wanders

Online Resources

1. https://www.coursera.org/learn/northeastern-data-privacy
2. https://cognitiveclass.ai/courses/data-privacy
3. https://onlinecourses.nptel.ac.in/noc22_cs37/preview

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	2	2	1	1				1	1	2	2
CO2	2	1	2	2	2		1					1	2	2
CO3	2	2	1	2	2	1						1	2	2
CO4	1	1	1	2	2	1			1			1	2	2

Course Articulation Matrix

Program	Bachelor of Computer Applications (CS & F)					
Year	I		Semester		I	
Course Name	Fundamentals of Computer & Programming in 'C'					
Code	BCACSN11102					
Course Type	DSC		**L**	**T**	**P**	**Credit**
Pre-Requisite			3	1	0	4
Course Objectives	The subject focuses on the fundamental of Computer and its peripherals with modern technology along with methodology of programming with concepts of C Programming.					
Course Outcomes						
CO1	Demonstrate the knowledge of the basic structure of computer, History of Computer, Hardware, Software, Input /Output devices, Computer languages, Language Translators.					
CO2	Describe the concept of data communication and networks along with the few concepts of modern technology.					
CO3	Learn various constructs of C Language along with programming constructs.					
CO4	Understand the concept of array, structure, functions, and pointers.					

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Introduction to Computers:** Introduction to computer, Basics of computers and its operation, History of computer, Capabilities and limitations of computers, Types of computers; **Hardware:** CPU(Architecture & Related Technology); **Storage Devices:** Primary & Secondary; Auxiliary Storage Devices; Cache Memory; Memory Hierarchy; Buffering and Spooling; **Software:** System Software and Application Software; **Input devices; Output Devices; Operating System**: Functions, Types, Need of Operating System; **DOS; Translator**: Compiler, Interpreter & Assembler; **Types of Languages**: Machine Language, Assembly Languages, High level Languages; Loader, Linker, **Flowchart; Algorithms**: Introduction, Definition, Characteristics, Limitations.	15	CO1
2	**Computer Networks & Internet:** Data communication: Signaling & Transmission; Network Devices: HUB, Switches, Router, Gateways; Types of Network; Topology; Transmission Mode & Media; Switching Techniques, Internet and protocol, Internet services, OSI reference model; TCP/IP Reference Model. **Introduction to Data Science & Analysis**: Artificial Intelligence, Soft Computing, Cloud Computing, IOT, Digital Marketing.	15	CO2
3	**Introduction to C**: Introduction; Structure of C Program; Writing the first C Program; File used in C Program; Compiling and Executing C Programs; Comments; **Data Types, Tokens**: Keywords, Literals, Identifiers, Variables, Constants; I/O Statements; **Operators**: Types of operators, Precedence and Associativity of operators; Programming Examples; Type Conversion and Type Casting. **Decision Control Statements**: If, If-Else, Nested If, If-Else Ladder, Switch-Case; **Iterative Statements**: For Loop, While Loop, Do-While Loop; **Jump Statement**: Break, Goto and Continue.	15	CO3
4	**Introduction to Array, Structures, Union: Array** : Types of Array: Single Dimension Array, Two-Dimensional Array; Address Calculation of an Element in Array; Insertion and	15	

| | Deletion in an Array; **Functions:** User-Defined Functions; Function Declaration; Types of Arguments: Actual Arguments, Formal Arguments; Function Definition; Methods to Call a Function: Call by Value, Call by Reference; Passing Arrays as Parameters; Storage Classes; **Pointers:** Declaration of Pointer Variables; Pointer Arithmetic; Pointers and Arrays, Pointer and Character Strings, Array of Pointers, Pointers as Function Arguments; **Structure , Union & Enumeration.** | | CO4 |

Suggested Readings
1. E. Balagurusamy, "Fundamentals of Computers", McGraw Hill Education.
2. Thareja R., "Fundamentals of Computers", Oxford University Press.
3. Peter Norton's, "Introduction to Computers", TMH Publications
4. E. Balagurusamy, "Programming in ANSI C", TMH Publications.
5. Reema Thareja, "Programming in C", OXFORD University Press.
6. Raja Raman. V, "Fundamentals of Computers", PHI Publications, 3rd Edition, 2004.

Online Resources
1. https://nptel.ac.in/courses/106104128
2. https://archive.nptel.ac.in/courses/106/104/106104128/

Course Articulation Matrix														
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			1	2	2		2	1		1	2	1
CO2	1	3	1		2	3	2		2	1		1	3	1
CO3	3	2	2	3	2	3	2		2	2		3	2	3
CO4	2	3	3	3	3	3	2		2	3		3	3	3

Program	Bachelor of Computer Applications (CS & F)					
Year	I		**Semester**		I	
Course Name	Web Designing					
Code	BCACSN11103					
Course Type	DSC		**L**	**T**	**P**	**Credit**
Pre-Requisite			3	1	0	4
Course Objectives	To focus on the process of Web Designing and build sound concepts of different languages like HTML, CSS, and JavaScript and tools used in Web Designing along with creating event-based web forms using advances features of JavaScript.					
Course Outcomes						
CO1	Understand the basic concept of HTML and application in web designing.					
CO2	Students develop static and dynamic website using HTML and CSS.					
CO3	Understanding the basic concept of Java Script and its application.					
CO4	Student able to develop personal and professional websites.					

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Basics of Web Designing:** Introduction to Web (www), Uniform Resource Locator (URL), Hypertext Transfer Protocol (HTTP), Introduction to Internet, Web Browsers, Web Clients, Web Servers , Introduction to HTML: HTML tags and its attributes; Text Formatting tags; Various types of Lists: Ordered, Unordered, Definition lists ;Table tags: Methods to Create Tables, Attributes of table tag, Col span and Row span; Frame tags and its Attributes; Form tag: Creation of Forms, Textbox, Radio Button, Hidden ,etc.; Image, Anchor Tag ; Links to External Documents: Inter-page and Intra-page linking.	15	CO1
2	**DHTML and CSS:** Introduction to DHTML: Uses of DHTML, Features of DHTML, Components of Dynamic HTML, Advantages and disadvantage of DHTML; CSS (Cascading Style Sheet): Font Attributes, Color and Background Attributes Text Attributes, Border, Margin related Attributes, List Attributes; Types of Style Sheet-Inline, External and Embedded; CSSP (Cascading Style Sheet Positioning); Document Object Model; JSSS (JavaScript assisted Style Sheet); Browser objects; DHTML Events.	15	CO2
3	**Scripting languages(JavaScript):** Introduction to JavaScript: Basic Programming Techniques: Data Types, Creating Variables and JavaScript Array; Operators and Expressions in JavaScript: Arithmetic , Logical, Comparison , String and Conditional Operators; JavaScript Programming Constructs: Conditional checking, Loops; Functions in JavaScript: Built in Functions and User Defined Functions; Dialog Boxes: Alert , Confirm and Prompt Dialog Box; JavaScript Document Object Model (DOM):Object hierarchy in DOM, Event Handling; Form Object: Form Object's Methods and Properties, Text Element, Button Element; Other Built in Objects in JavaScript, String, Math and Date Object; Writing Client Side Validations from HTML Form Elements.	15	CO3
4	**Cookies and Browser data:** creating, reading, writing, deleting cookies, setting the expiration date of cookie; Browser: opening a window, giving the window focus, window position, changing the content of window, closing a window, scrolling a web page, multiple windows at once, creating a web page in	15	CO4

	new window; JavaScript in URLs, JavaScript security, Timers, Browser location and history.		

Suggested Readings

1. Xavier, C, "Web Technology and Design", New Age International Publications.
2. Bayross Ivan," HTML, DHTML. JavaScript, and PHP", BPB Publications.
3. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill.
4. Ramesh Bangia, "Internet and Web Design", New Age International.
5. Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", Wiley India
6. Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India

Online Resources

1. https://www.youtube.com/watch?v=h_RftxdJTzs
2. https://youtu.be/uUhOEj4z8Fo

Course Articulation Matrix													
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	3	2	2		2	2	1	3	2	2
CO2	2		3		2	2	2	1	2	2		1	3	3
CO3		2	2	2	2	3	2		1	3		2	3	3
CO4	2		3		2	2	2		3	2	2	3	3	3

Program	Bachelor of Computer Applications (CS & F)					
Year	I		Semester		I	
Course Name	Basic Mathematics					
Code	BCACSN11104					
Course Type	DSC		L	T	P	Credit
Pre-Requisite			2	0	0	2
Course Objectives	To introduce the fundamental concepts of Mathematics this will help and guide students to understand and make comprehensive rest of the course.					
Course Outcomes						
CO1	Understand the concept of Sequence, Matrices and Determinant.					
CO2	Understand the concept of Differentiation and Integration.					

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Finite and Infinite Sequences:** Definition, nth term, Sum of n terms of sequence, Arithmetic Progression, Geometric Progression and Harmonic Progression. **Matrices and Determinant:** Definition, Types of matrices, multiplication of matrix by scalar, Sum of matrices, difference of matrices, Product of matrices, Transpose of matrix. Determinant: definition and basic properties.	15	CO1
2	**Differentiation and Integration:** Meaning and geometrical interpretation of derivative, derivatives of simple algebraic and trigonometric function, derivatives of sum/difference, product and quotient of function, **Integration:** Integration as the inverse of differentiation, Integration of algebraic and trigonometric function, Definite Integral.	15	CO2

Suggested Readings
1. O.P. Malhotra, S. K. Gupta, "Mathematics", S. Chand, 2000 Edition
2. Shanti Narain, "Textbook of Matries", S. Chand

Online Resources
1. https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-ma04/
2. https://archive.nptel.ac.in/courses/111/106/111106146/

Course Articulation Matrix														
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1		1	1							1	1	1
CO2	1	1	1	2	2	1	1					2	2	2

Program	Bachelor of Computer Applications (CS & F)				
Year	I		Semester		I
Course Name	Basics of Cyber Laws and Indian IT Act 2000				
Code	BCACSN11111				
Course Type	GE		L	T	P	Credit
Pre-Requisite			3	1	0	4

Course Objectives	The objective of the Basics of Cyber Law and Indian IT Act course is to provide students with a comprehensive understanding of the legal principles, regulations, and provisions related to cybersecurity and information technology in India, enabling them to navigate legal issues and challenges in the digital domain in compliance with Indian laws.

Course Outcomes	
CO1	Students will gain a thorough understanding of cyber law principles and the Indian IT Act.
CO2	Students will be able to apply legal principles to address cybersecurity and IT-related issues.
CO3	Students will develop skills to navigate legal challenges in the digital domain in compliance with Indian laws.
CO4	Understand the legal provisions related to specific cybercrimes and liabilities attached to such crimes.

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Introduction to Cyber Laws and Cyber Space:** Definition of Cyber Law, Cyber Space and Netizen, Origin/history & functioning of the Internet, Cyber World and the rule of Law in Cyber World, Significance of Law in Dealing with Challenges Faced by Cyber World, Issues of Jurisdiction and Applicable Law in Cyberspace, International Treaties, Conventions and Protocols Concerning Cyberspace.	15	CO1
2	**Intellectual Property Rights in Cyberspace:** Concept of Property in Cyber Space, Implication on Intellectual Property Rights – International & National Legal Preparedness, Interface with Copyright Law, Patent Law, Trademarks & Domain Names Related issues, The ICANN Uniform Domain Name Dispute Resolution Policy.	15	CO2
3	**Information Technology Act, 2000 – Cyber Law in India:** Historical background & Objectives, Legal Recognition of Electronic Records and Procedures, Legal Recognition of Digital Signature, Electronic & Digital Signatures – legal issues, E Commerce Certifying Authority and its Role, Cyber Appellate Tribunal, Grey Areas of Information Technology Act, 2000.	15	CO3
4	**Cyber Crimes & Legal Framework:** Kinds of Offences and Penalties defined under the IT Act, 2000, Cyber Crime against – Person, Property & Government, E-Evidence and Computer Forensic, Concept of E-Litigation, Right to Privacy and its Legal Framework.	15	CO4

Suggested Readings

1. Pavan Duggal, "Textbook on Cyber Law", Universal Law Publishing Co.
2. Dr. Jyoti Rattan, "Cyber Laws & Information Technology", Bharat Law House Pvt. Ltd.
3. Pavan Duggal, "Cyber Law- The Indian Perspective", Saakshar Law Publications
4. Farooq Ahmad, "Cyber Law in India (Internet)", New Ena Law Pub. Faridabad
5. Nandan Kamath, "Law Relating to Computers Internet & E-commerce - A Guide to Cyber laws & the Information Technology", Universal Law Publishers

6. Dr. Talat Fatima," Cyber Crimes", Eastern Book Company.

Online Resources
1. https://www.youtube.com/watch?v=F7mH5vz1qEI
2. https://www.youtube.com/watch?v=0zUpe_E2b4M.
3. https://www.youtube.com/watch?v=ejceoib0GUE
4. https://www.youtube.com/watch?v=czDzUP1HclQ
5. https://www.c-span.org/video/?117927-1/rescheduled-cyber-crime-modernizing-legal-framework-information-age

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1	1	1	2	1				1	1	2	1	1
CO2	1	1	2	1	2	1	1		1	1	1	2	2	
CO3		1	1	2	1	2	2	1			1	2	1	
CO4		1	2	2	2	3	2	2			1	2	2	

Table title: **Course Articulation Matrix**

Program	Bachelor of Computer Applications (CS & F)				
Year	I	**Semester**		I	
Course Name	Basics of Cyber Security				
Code	BCACSN11112				
Course Type	GE	**L**	**T**	**P**	**Credit**
Pre-Requisite		3	1	0	4
Course Objectives	This course aims to provide students with a foundational understanding of cyber security principles, technologies, and practices. By the end of the course, students will be equipped with the knowledge and skills to identify and mitigate cyber threats, apply security controls, and effectively respond to security incidents.				
Course Outcomes					
CO1	Demonstrate understanding of cyber security principles.				
CO2	Apply security controls and practices effectively.				
CO3	To understand the basics of security policies appropriately.				
CO4	To understand the basics of Biometrics and its functionalities				

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Information Security Fundamentals:** An Overview of Information Security: The Basic Components; CIA Trait, Threats; Virus, Worms, Phishing, DoS and DDoS, SQL Injection, Buffer Overflow, Spyware, Adware and Ransomware. Policy and Mechanism, Assumptions and Trust, Assurance, Operational Issues, Human Issues.	15	CO1
2	**System Security:** Introduction to System Security, Aspects of System Security, Need for Security, Goals of System Security, **Security Policies:** Confidentiality, Integrity, Availability Policies, and Hybrid Policies. Features of a Good Security Policy, Security Attacks, Security Services, and Mechanisms.	15	CO2
3	**Security Procedures and Practices:** Principles of Security, Steganography, Cryptographic Techniques: Symmetric Cryptography, Asymmetric Cryptography, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Block Cipher Principles, Block Cipher Modes of Operation, Encryption and Decryption.	15	CO3
4	**Authentication:** Basics of Authentication, 1Factor Authentication, 2 Factor Authentication, Multi Factor Authentication, One Time Password (OTP), Access Control, Types of Access Control Mechanism, Passwords: Attacking a Password System, Countering Password Guessing, **Biometrics:** Introduction to Biometric.	15	CO4

Suggested Readings

1. William Stallings, Computer Security: Principles and Practices, Pearson 6 Ed, ISBN 978-0-13-335469-0 2.
2. Matt Bishop, "Introduction to Computer Security", Addition Wesley, 2005
3. Nina Godbole, Sunit Belapure, Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiely India Pvt. Ltd, ISBN- 978-81-265-2179-1 1.
4. CK Shyamala et el., Cryptography and Security, Wiley India Pvt. Ltd, ISBN-978-81-265-2285-9.
5. Berouz Forouzan, Cryptography and Network Security, TMH, 2 edition, ISBN -978-00-707-0208-0.

Online Resources

1. https://www.youtube.com/watch?v=fQ3ESFfvchg
2. https://www.youtube.com/watch?v=_mxufDbcK5A
3. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
4. https://www.digimat.in/nptel/courses/video/106105031/L01.html
5. https://www.youtube.com/watch?v=tKDKagi5jqI

6. https://www.youtube.com/watch?v=kjbDHOAM8cw

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	1	1						1	1	1
CO2	2	1	1	2	2	1	1					2	2	2
CO3	2	2	3	3	2	2	2	1	1	2	1	1	2	2
CO4	2	2	3	3	2	2	2	1	2	2	1	1	2	2

Course Articulation Matrix

Program	Bachelor of Computer Applications (CS & F)				
Year	I		Semester		I
Course Name	Programming in 'C' Lab				
Code	BCACSN11151				
Course Type	DSC-Lab	L	T	P	Credit
Pre-Requisite		0	0	4	2
Course Objectives	To provide the fundamental knowledge about various concepts of 'C' Programming using various constructs like if, if-else, switch case, for loop, do while, etc. and apply code reusability using functions and pointers.				
Course Outcomes					
CO1	Understand various constructs of the C Language along with proper syntax.				
CO2	Develop programs using functions, pointers, structure, union on various topics.				

Module	Course Contents	Contact Hrs.	Mapped CO
1	1. Implementation of Fundamental Data Types. 2. Implementation of Fundamental Operators. 3. Implementation of Conditional Program such as if, switch etc. 4. Implementation of Basic Control Constructs such as For Loop, While Loop, Do While Loop. 5. Implementation of Functions. 6. Implementation of Functions using call by value and call by reference. 7. Implementation of This pointer.	15	CO1
2	1. Implementation of Structures, Union, and Enumeration etc. 2. Implementation of Pointers. 3. Implementation of Pointers as Function Arguments. 4. Implementation of Pointer to Pointer. 5. Implementation of Nested Structure.	15	CO2

Suggested Readings
1. E. Balagurusamy, "Programming in ANSIC", TMH Publications.
2. Reema Thareja, "Programming in C", OXFORD University Press.
3. Peter Norton's, "Introduction to Computers", TMH Publications
4. Kernighan, Ritchie,"The C Programming Language", PHI Publications
5. Yashwant Kanitakar, "Let us C", BPB Publications

Online Resources
1. https://nptel.ac.in/courses/106104128
2. https:/cse02-iiith.vlabs.ac.in/

Course Articulation Matrix													
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	3	2	2	3		1	2	2	1	2	3
CO2			2	3	3								2	3

Program	Bachelor of Computer Applications (CS & F)				
Year	I	**Semester**		I	
Course Name	Web Designing Lab				
Code	BCACSN11152				
Course Type	DSC-Lab	**L**	**T**	**P**	**Credit**
Pre-Requisite		0	0	4	2
Course Objectives	To provide practical implementation on the process of Web Designing and build sound concepts of different languages and tools used in Web Designing using Dreamweaver framework.				
Course Outcomes					
CO1	Visualize and recognize the basic concept of HTML, DHTML and CSS in web designing.				
CO2	Understanding the basic and advanced concept of Java Script to create personal and/or business websites following current professional and/or industry standards.				

Module	Course Contents	Contact Hrs.	Mapped CO
1	1. Implementation of List Tags in HTML. 2. Implementation of Table Tag in HTML. 3. Implementation of Frame Tag in HTML. 4. Implementation of Form Tags in HTML. 5. Implementation of CSS (Inline, External and Embedded) in DHTML. 6. Implementation of Class Concept in DHTML. 7. Implementation of DHTML Events. 8. Implementation of CSS positioning. 9. Implementation CSS tables and links. 10. Implementation of CSS navigation bar.	15	CO1
2	1. Implementation of basic variables in Java Script. 2. Implementation of User Defined Functions in Java Script. 3. Implementation of inbuilt functions in Java Script. 4. Implementation of Form validation in Java Script. 5. Develop JavaScript to implement the switch-case statement for the given problem. 6. Develop JavaScript to implement loop for solving the given iterative problem. 7. Perform the specified string manipulation operation on the given String(s). 8. Implementation of JavaScript to design a form to accept input values for the given problem. 9. Use JavaScript to implement form events to solve the given problem. 10. Develop JavaScript to dynamically assign specified attribute value to the given form control create cookies based on the given problem. 11. Develop JavaScript to manage a cookie in the given manner. 12. 12. Implementing JavaScript to manipulate the specified attributes of window object in the given manner.	15	CO2

Suggested Readings

1. Xavier, C, "Web Technology and Design", New Age International Publications.
2. Bayross Ivan," HTML, DHTML. JavaScript, and PHP", BPB Publications.
3. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill.
4. Ramesh Bangia, "Internet and Web Design", New Age International.

5. Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", Wiley India
6. Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India

Online Resources

1. https://html-iitd.vlabs.ac.in/
2. https://www.cybrary.it/practice-lab/introduction-to-programming-using-java-script

Course Articulation Matrix														
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	3	2	2		2	2	1	3	2	2
CO2	2		3		2	2	2	1	3	2		1	3	3

SECOND SEMESTER

Program	Bachelor of Computer Applications (CS & F)				
Year	I	Semester		II	
Course Name	Cyber Security				
Code	BCACSN12101				
Course Type	DSC	L	T	P	Credit
Pre-Requisite		3	1	0	4
Course Objectives	This course comprises a unique mix of cybersecurity technical and real-world industry skills, brought to provide awareness on the impact of cybersecurity threats in key industries and geographies, analyze top targeted industries and trends and explore how cyber criminals are using operating system tools to get control.				
Course Outcomes					
CO1	Analyze top targeted industries and trends and explore how cyber criminals are using operating system tools to get control.				
CO2	Uncover why cyber criminals are changing their techniques to gain illegal profits and determine what steps you can take to protect your organization against these threats.				
CO3	Understand tools used by penetration testers and ethical hackers (network CLI tools, Telnet, SSH, Nmap, Wireshark, and many others).				
CO4	Leverage high-end security enterprise solutions in high demand such as: IBM QRadar SIEM, Vulnerability Manager and Participate in Security Operation Center (SOC) role-playing scenarios.				

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Understand the current impact of cyber security threats**: Research global cyber security trends in different geographies, familiarize with the taxonomy of cyberattacks, Explore the enterprise cyber security domains, Explore the most frequently targeted industry sectors including Government, Energy and Utilities, Retail and Telecom Explore the cyber resilience framework understand the cyber resilience lifecycle.	15	CO1
2	**Understand the need for a cyber-threat hunting approach:** Explore cyber-attack adversary frameworks, Investigate enterprise threat protection methods, Explore industry case studies **Understand network attack trends in the financial sector using crypto miners:** Understand how cyber criminals use networks in the dark web to perform illicit crime activities, Learn network protection practices like DNS, VPN, Understand enterprise network security practices through the analysis of an advanced persistent threat.	15	CO2
3	**Explore the mobile and IoT global phenomena:** Understand mobile and IoT attack surface, Explore recent most threatening IoT cyber-attack scenarios, Learn to protect your home and organization with endpoint protection practices **Understand the wide adoption of industry applications:** Learn web application fundamentals, Investigate application security practices, Examine the anatomy of the most dangerous applications threats **Understand the impact of data breaches and ransomware in Government and Health sectors:** Research the anatomy and impact of Insider Threat and Phishing cyber-attacks, of Research the anatomy and impact Ransomware and Cyber Fraud cyber-attacks, Explore a Healthcare end-to-end industry case study	15	CO3
4	**Understand the reason of the global enterprise adoption of cloud computing:** Understand the cloud security challenges	15	

| | brought by an integrated data, network, access infrastructure, Review the key cloud security practices for the enterprise, Explore a Telco cloud data breach scenario **Understand the drivers behind the enterprise adoption of Security Intelligence methods and tools:** Explore the characteristics of Security Information and Event Management (SIEM) platforms, Explore SIEM in Action through a real-life Phishing attempt scenario **Understand the Incident Response and Threat hunting practice:** Explore the benefits of establishing a SOC (security Operation Center), understand the roles and responsibilities of SOC Operations team. | | CO4 |

Suggested Readings
1. Cyber Security Practitioner by IBM Corporation.
2. IBM QRadar SIEM Foundations by IBM Corporation.

Online Resources
1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview
2. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
3. https://cognitiveclass.ai/courses/apply-end-to-end-security-to-a-cloud-application

Course Articulation Matrix													
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	3	1	2			1	1	1	2	2
CO2	3	2	3	3	3	2	1		2	1	1	1	2	2
CO3	3	2	3	3	3	2	2		2	1	1	1	2	2
CO4	2	2	2	2	2	1	2		2			1	2	2

Program	Bachelor of Computer Applications (CS & F)						
Year	I		Semester		II		
Course Name	Security Data Privacy Laws and Standards						
Code	BCACSN12102						
Course Type	DSC		**L**	**T**	**P**	**Credit**	
Pre-Requisite			2	0	0	2	
Course Objectives	This course will examine legal, policy, and enterprise issues and problems related to security and privacy Learn about the Cyber Fraud and its Protection and Knowledge of laws and regulations concerning information security from both data protection and law enforcement perspectives, Knowledge and implementation of Cyber Laws with Electronic data will be the focus, but other forms of information also will be considered.						
Course Outcomes							
CO1	An understanding of concepts and expectations concerning privacy and the increasingly interconnected issue of security and Learn about Cyber Fraud and its Protection.						
CO2	Knowledge about internal and external audits and learn the various data privacy acts and IT Acts.						
Module	**Course Contents**				**Contact Hrs.**	**Mapped CO**	
1	**Cyber Law-Cybercrime:** Introduction to cybercrime and cyber law. Type of Cyber Crime. Law Enforcement and cybercrime, what is a Trusted system? Security Policies Methods of security, trusted operating system design, Assurance in Trusted Operated system, Knowing the basics of IP Addresses, Introduction to database, Security Requirements, Reliability and Integrity, Sensitive data, Inference, Multilevel databases, SQL Injections Vulnerability, Introduction, international cybercrime law and its case studies. Digital Piracy, Identity Theft, Cyber Bullying, Cyber Stalking, Cyber Harassment, Cyber Terrorism, Cyber Wars and Sex Crimes over Internet – Prostitution, Child Pornography.				15	CO1	
2	**Security Implementation and Fraud Security Models:** Security planning, Risk analysis, Organization and security Policies, Physical Security. Securing the Operating System with Admin Privileges. Protecting Programs and data, Information and law, Rights of Employer Security, Case studies of Ethics, Digital Analysis, Digital Evidence and Forensic Tools, The Challenges of Password Management, Single Password v/s Multiple Passwords, Considerations for Using, Different Passwords for Different Applications, Good Password Management Policies and User System Security Features, Definition of Computer Fraud or Cyber Fraud – Characteristics Cyber Fraud Offense, fraud related Offenses. Law Enforcement Options, Methodologies for Hiding Evidence, Different methods for tracking down cybercrimes. Introduction to Security models, Multifactor authentication versus multi step authentication, Multifactor authentication methods; Time-based one-time password, Frameworks, Standards, Security Certification ISO 17799/ ISO 27001, System Security Engineering Capacity Maturity Model, Laws and Legal Framework for Information Security, Recovery, and risk analysis.				15	CO2	

Suggested Readings
1. Timothy Morey Andrew Burt, Thomas C. Redman, Christine Moorman "Customer Data and Privacy: The Insights You Need from Harvard Business".
2. Naavi "Personal Data Protection Act of India (PDPA 2020)".

Online Resources
1. https://www.talend.com/resources/data-privacy/
2. https://www.varonis.com/blog/data-privacy
3. https://cognitiveclass.ai/courses/apply-end-to-end-security-to-a-cloud-application

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Course Articulation Matrix														
CO1	2	2	2	2	2	1	1		1		1	1	2	2
CO2	1	2	1	2	2	1	2					1	2	2

Program	Bachelor of Computer Applications (CS & F)					
Year	I		**Semester**		II	
Course Name	Operating System					
Code	BCACSN12103					
Course Type	DSC		**L**	**T**	**P**	**Credit**
Pre-Requisite			3	1	0	4
Course Objectives	To provide a good understanding of the underlying concepts of operating systems.					
Course Outcomes						
CO1	Understand the principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.					
CO2	Understand the mechanisms used for process synchronization & handling deadlock.					
CO3	Understand the concept of memory management and virtual memory.					
CO4	Understand the file system structure and storage management.					

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Introduction and Process Management:** Operating System: System Components, System Calls and its types, System Programs; Types of Operating System; Operating System Structure: Simple Structure, Layered Approach, Microkernels, Exokernels; Virtual machine; Introduction to Process: Process States, Process Control Block; Process Scheduling: Scheduling Queues, Schedulers, Context Switch, Scheduling Objectives, Scheduling Criteria; Scheduling Algorithms: First Come First Serve, Shortest Job First, Round Robin, Priority; Multiple-Processor Scheduling; Real-Time Scheduling; Multilevel Feedback Queue Scheduling; Threads.	15	CO1
2	**Process Synchronization and Deadlocks**: Critical- Section Problem; Peterson's Solution; Semaphore: Usage of Semaphore; Classical Problems of Synchronization: Producer Consumer, Readers-Writer, Dining Philosophers; Deadlock System Model; Deadlock Characterization: Necessary Condition, Resource- Allocation graph; Deadlock Handling Methods: Deadlock Prevention, Deadlock Avoidance Mechanisms: Resource Allocation graph Algorithm, Banker's Algorithm, Deadlock Detection and Recovery.	15	CO2
3	**Memory Management**: Memory Management Strategies: Address Binding, Logical and Physical Address Space, Dynamic Linking; Swapping; Contiguous and Non- Contiguous Memory Allocation; Paging; Segmentation; Virtual Memory Management Concept; Demand Paging; Page Replacement Policies: Basic Page Replacement, FIFO Page Replacement, LRU Page Replacement, Optimal Page Replacement, Counting Based Page Replacement; Allocation of Frames: Minimum Number of Frames, Allocation Algorithm, Global Versus Local Allocation; Thrashing: Cause of Thrashing, Working Set Model.	15	CO3
4	**Storage Management:** File Concept: File Attribute, File Operations, File Types, File Structure; File Access Method: Sequential Method, Direct Access Method; Directory Structure; File System Implementation: File System Structure, Allocation Methods, Free space Management; Secondary Storage Structure: Disk Structure, Disk Scheduling Algorithms, Disk Management.	15	CO4

Suggested Readings

1. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", Addison-Wesley.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall.
3. Milan Milankovic, "Operating Systems, Concepts and Design", TMH.
4. William Stallings, "Operating Systems: Internal and Design Principles", PHI.
5. D M Dhamdhere, "Operating System- a Concept based Approach", McGraw Hill Education.

Online Resources

1. https://archive.nptel.ac.in/courses/106/105/106105214/
2. https://onlinecourses.nptel.ac.in

<table>
<tr><th colspan="15">Course Articulation Matrix</th></tr>
<tr><th>PO-PSO</th><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th></tr>
<tr><td>CO1</td><td>3</td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td></td><td></td><td>1</td><td>1</td><td>3</td><td>2</td><td></td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td></td><td>3</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td>2</td><td>1</td><td>3</td><td>2</td><td></td></tr>
<tr><td>CO3</td><td>2</td><td>2</td><td></td><td>2</td><td></td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>2</td><td></td></tr>
<tr><td>CO4</td><td>2</td><td>1</td><td></td><td>2</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>1</td><td>1</td><td>2</td><td>2</td><td></td></tr>
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Program	Bachelor of Computer Applications (CS & F)						
Year	I		Semester			II	
Course Name	Basic of Python Programming						
Code	BCACSN12104						
Course Type	DSC		L	T	P	Credit	
Pre-Requisite			3	1	0	4	
Course Objectives	This subject provides in-depth knowledge of developing and debugging Python Programs using core data structures like Lists, Dictionaries, Tuples, and Strings as well as understand the concept of functions, modules and file handling and classes and objects.						
Course Outcomes							
CO1	Acquire programming skills in core Python using various programming constructs.						
CO2	Implement Python programs using functions and strings.						
CO3	Implement methods to create and manipulate lists, tuples, and dictionaries.						
CO4	Apply the concepts of file handling and basic introduction to object and classes.						

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Introduction to Python:** Introduction to python ,History of python, Installing python, Executing python programs, Comments in python, Internal working of python, Python Implementations, Difference between Python2 and Python3, Indentation , Python character set, Tokens; **Core Data Types:** Integer, Floating Point Number, Complex Number, Boolean Type, String Type; print(), Assigning values to a variable, Multiple Assignments, input(), eval(), Formatting Number & String, Python inbuilt mathematical function, ord and chr Functions; **Python Operators & Expression:** Types of operators; Operator Precedence & Associativity. **Decision Statement:** if, if-else, nested if, multiway if-elif-else statement, conditional expression; **Loop Control Statement**: while Loop, for loop, range(), Nested Loops, break, continue, pass.	15	CO1
2	**Functions:** Syntax, use of function, return statement, parameters & arguments: Required argument, Default argument, Keyword Arguments, Variable length argument; Scope of a variable, Recursive function, Lambda function, Python Modules, Built-in Modules in Python: math, random, time & date module; **String:** str class, index[] operator, Traversing: for & while loop, Immutable strings, string operators: slicing, +, *; String operations: comparison, format(), split(), Built-in method: Testing String, search a substring, convert string from one to another, stripping String, Formatting String	15	CO2
3	**Lists:** Creation, list(), Accessing Elements in List, Negative List Indices , List Slicing[start: end], Built-in list class Methods, List operators, List Comprehension, List &Strings, Passing list to a function and returning from a function; **Tuple:** Creation, tuple(), Built-in tuple class methods, Indexing & slicing, Operations on tuple, Variable length tuple to functions, List & Tuple, Sort, Traverse, zip(), Inverse zip(*); **Sets**: Creation, set(), set operator, Built-in set class methods, Set operations: union(), intersection(), difference(), symmetric_difference().	15	CO3
4	**Dictionary**: Creation, dict(), Adding values, Replacing values, Retrieving Values, Formatting, Deleting items, Comparing,		

	Built-in dict class methods, Traversing, Nested Dictionary, Traversing Nested Dictionary; **File Handling:** File Path, Types of Files, Opening and closing files, reading and writing files, file positions, renaming and deleting files, directory methods; **Classes and Objects:** Defining Classes, Creating objects, self-parameter and adding methods to a class.	15	CO4

Suggested Readings

1. Ashok N. Kamthane & Amit A. Kamthane, "Programming and Problem Solving with Python", McGraw Hill Educations
2. Reema Thareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173
3. Kenneth A. Lambert, "The Fundamentals of Python: First Programs", Cengage Learning, ISBN: 978-1111822705.
4. Guido Van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011
5. Jake VanderPlas ,"Python Data Science Handbook", O'Reilly Publications
6. David Beazley, "Python Essential Reference (4th Edition) "Addison Wesley
7. Vernon L. Ceder," The Quick Python Book, Second Edition", Manning Publications

Online Resources

1. https://archive.nptel.ac.in/courses/106/106/106106182/
2. https://mrcet.com/downloads/digital_notes/CSE/III%20Year/PYTHON%20PROGRAMMING%20NOTES.pdf
3. https://rajivbhandari.files.wordpress.com/2018/11/nptel-6.pdf

Course Articulation Matrix													
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	2	2	1	2		2	3	1	1	3	3
CO2	2	2	1		2	1	2		2	2		2	2	2
CO3	1	2	2	2		2	1			1	1	2	3	2
CO4	2		2		2	2			3	1	1	3	3	3

Program	Bachelor of Computer Applications (CS & F)						
Year	I		Semester		II		
Course Name	Digital Security and Forensic Fundamental						
Code	BCACSN12111						
Course Type	GE		**L**	**T**	**P**		**Credit**
Pre-Requisite			3	1	0		4
Course Objectives	The objective of this course is to provide students with a fundamental understanding of digital security and forensic concepts, including digital threats and attack methods, security measures and controls, incident investigation and response, and legal and ethical considerations in the digital domain						
Course Outcomes							
CO1	Students will be able to demonstrate a foundational understanding of digital security and forensic concepts.						
CO2	Students will be able to identify digital threats, apply security measures, analyze, and investigate security incidents.						
CO3	Students hand on practice with Open-source Digital Forensics Platform and tools.						
CO4	Evaluate and implement measures to secure digital systems and networks, including the ability to assess vulnerabilities, design and implement security controls						

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Introduction to Digital Security**: Digital Security Threats and Attack Methods, Principles of Information Security, Operational Security (OPSEC), People's Role in Information Security, Access Control and Authentication, Physical Security, Cryptography and Encryption, Public Key Infrastructure, Digital Signatures, Steganography and Covert Channels, Network Security Fundamentals	15	CO1
2	**Internet and Web Application Security:** IP level security, IPSEC, Transport Layer Security, Application Layer Security: PGP, Firewalls, VPN, Email security: PGP and SMIME, Email Forensics, Web Security: Web authentication, Injection Flaws, SQL Injection, Web Browser Security, E-Commerce Security, Physical Security.	15	CO2
3	**Digital Forensics:** Digital Forensics Fundamentals, Incident Response and Investigation Techniques, Preservation, Collection, and Analysis of Digital Evidence, Chain of Custody, Windows, UNIX file system, Computer Artifacts, Hardware Specific Acquisition—SIM cards, Cell Phone, USB storage, etc., Data Type Acquisition—audio files, video files, image files, network files, log files, Forensic Tools	15	CO3
4	**Digital Forensics Tools and Techniques**: Open-Source Digital Forensic Tool: Autopsy, The Sleuth Kit, Volatility, OpenStego, Wireshark, Ghiro, Log2Timeline, OSForensics, Understanding Forensic Imaging, DFF (Digital Forensics Framework) & LibreOffice, Introduction to memory forensics, Data Recovery, Legal and Ethical Considerations in Digital Forensics, Rules of evidence, Forensic Reporting.	15	CO4

Suggested Readings

1. M. E. Whitman and H. J. Mattord, "Principles of Information Security," 2018.
2. J. R. Vacca, "Computer Security and Digital Forensics: Fundamentals of Digital Forensics," 2016.
3. M. T. Britz, "Digital Forensics and Cyber Crime: An Introduction," 2013.
4. B. Nelson, A. Phillips, and C. Steuart, "Guide to Computer Forensics and Investigations," 2019.
5. Altheide and H. Carvey, "Digital Forensics with Open-Source Tools," 2011.

Online Resources

1. Volatility: https://github.com/volatilityfoundation/volatility
2. Autopsy: https://www.autopsy.com/
3. Redline: https://fireeye.market/apps/211364
4. Velociraptor: https://github.com/Velocidex/velociraptor

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Course Articulation Matrix														
CO1	2	2		2	2	1			1			1	2	2
CO2	2	3	2	3	2	1	1			1	1	1	2	2
CO3	3	2	1	2	2	1	1		1	1		1	2	2
CO4	2	3	1	1	2	1	1		1	1		2	3	2

Program	Bachelor of Computer Applications (CS & F)					
Year	I		**Semester**		II	
Course Name	Forensic Incident Management					
Code	BCACSN12112					
Course Type	GE		**L**	**T**	**P**	**Credit**
Pre-Requisite			3	1	0	4
Course Objectives	The objective of the Incident Management course is to equip students with the knowledge and skills required to effectively manage and respond to cyber incidents. Through a combination of theoretical learning and hands-on exercises, students will gain a comprehensive understanding of incident identification, assessment, prioritization, and response strategies within the field of cyber forensics.					
Course Outcomes						
CO1	Demonstrate a comprehensive understanding of incident management principles and processes within the cyber domain.					
CO2	Apply effective incident response strategies to minimize the impact of cyber incidents and mitigate further risks.					
CO3	Communicate and coordinate effectively with stakeholders during incident response activities, including IT teams, management, and law enforcement if necessary.					
CO4	Evaluate and improve incident management processes, including the ability to conduct post-incident analysis, identify lessons learned, and implement preventive measures.					

Module	Course Contents	Contact Hrs.	Mapped CO
1	**Introduction to Incident Response:** Seven Stage of Incident Response, Incident Response Life Cycle, Post Incident Activity, The Security Incident Response Team Members, Types of Technical Skills Needed, Types of Personal Skills Needed, Incident Evidence, Incident Response Tools, Incident Response Policies, and procedures, SIRT IR Policies, Corporate IR Strategy and General Use Security Polices.	15	CO1
2	Forensics Process, Forensics Team Requirements Members, Member Criteria, Member Expertise, Member Certification, Forensics Team Policies and Procedures, Forensics Analysis Process, Data Collection, Chain of Custody, Evidence Handling and Control, Evidence "Hand-Over" to External Parties, LEO. Hardware Specific Acquisition – SIM Card, Cell Phone, USB Storage, Data Type Acquisition – Audio Files, Video Files, Image Files, Network Files, Log Files, Forensics Tools, Types of Forensics Tools, Tools for Specific Operating Systems and Platforms,	15	CO2
3	Legal Requirements and Considerations, Privacy, Ethics, Governmental Law, Polices and Procedures. Legalities of Forensics, Reasons for Legal, Statutory, And Regulatory Compliance, National Level Institutions dealing with Cyber Crimes in India, **Cyber Crime Reporting Portal:** Introduction, Process of Reporting cyber fraud or complaint, Cyber Policing, **Cyber Crime Investigation:** Evidence Act, Sections 43, 65 to 78 of IT Act. Sections 107, 109, 120B, 201, 378, 410 415 417 and 420 of the Indian Penal Code (IPC)	15	CO3
4	General Management and Team, General Team Management, Cooperate Level Management Considerations, Corporate Need to Support the Team Activities, Third Party Support During and	15	CO4

	After Events, Corporate IT-Related Security Relationship with SIR & FT, Relationship Management, Incident Response Team, CSIRT		

Suggested Readings

1. J. T. Luttgens, M. Pepe, and K. Mandia, "Incident Response & Computer Forensics," 2014.
2. Judicial Academy Jharkhand, "Cyber Crime: Investigation and Trail Under Under the Current Law", www.jajharkhand.nic.in
3. M. T. Britz, "Computer Forensics and Incident Response," 2014.
4. L. Johnson, "Computer Incident Response and Forensics Team Management: Conducting a Successful Incident Response," 2014.
5. E. C. Thompson, "The Art of Incident Response: A Comprehensive Guide to Modern Incident Response," 2018.

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CO1	2	2	1	2	2	2			1	1		1	2	2
CO2	1	2	1	2	2	1	2		1	1			2	2
CO3	1	2		1	1	1	2					1	2	2
CO4	1	2		2	1	2	1					1	3	2

Program	Bachelor of Computer Applications (CS & F)				
Year	I	**Semester**		II	
Course Name	Basics of Python Programming Lab				
Code	BCACSN12151				
Course Type	DSC-Lab	**L**	**T**	**P**	**Credit**
Pre-Requisite		0	0	4	2
Course Objectives	It provides the practical implementation of developing and debugging Python Programs using core data structures like Lists, Dictionaries, Tuples, and Strings as well as understand the concept of functions, modules and file handling and classes and objects.				
Course Outcomes					
CO1	Acquire programming skills in core Python using various programming constructs, functions, and strings.				
CO2	Implement methods to create and manipulate lists, tuples and dictionaries, file handling and basic introduction to object and classes.				
Module	**Course Contents**			**Contact Hrs.**	**Mapped CO**
1	1. Installing and configuring Anaconda on windows, Linux or mac. 2. Introduction to Jupyter lab, Variables, keywords, basics operation in python, Taking input in jupyter, console. 3. Taking multiple inputs from user in Python operators' implementation 4. Displaying Output using print () function, using end parameter in print (), 5. Practical implementation of the constructs like if, else, if elif ladder. 6. Implementation of range function in for loop. 7. Implementation of Special keyword - in and is, 8. Implementation of looping constructs using for loop, range function, and examples use of enumerate, zip function. 9. Implementation of strings in python, single quoted/double quoted/triple quoted Strings, string functions - split, trim, join, format, replace, count, find, index, rjust, ljust, center, upper, lower.			15	CO1
2	1. Practical implementation of list, creation and traversal, list functions - append, insert, extend, remove, pop, clear, sort, count, index, copy. 2. Practical implementation of tuples, creation, and traversal, 3. Practical implementation of Set, creation, and traversal, set functions - add, update, remove, clear, pop, union, intersection, difference, disjoint, subset, superset. 4. Practical implementation of Dictionary, creation and traversal, dictionary function - get, update, keys, items, values. 5. Creating functions in Jupyter calling function, argument-based functions, different type of style for passing parameter in python. 6. Making module for functions and importing them different types of imports in python. 7. Implementing random and math module OS module for file and folder operation.			15	CO2

	8. Creating a python program to open a file and check what are the access permissions acquired by that file using OS module. 9. Creating a python program to open and write "hello world" into a file. 10. Creating a python program to write the content "hi python programming" for the existing file. 11. Creating a python Program to display welcome to MRCET by using classes and objects. 12. Creating a python Program to call data member and function using classes and objects. 13. Creating a program to find sum of two numbers using class and methods		

Suggested Readings

1. Ashok N. Kamthane & Amit A. Kamthane, "Programming and Problem Solving with Python", McGraw Hill Educations
2. Reema Thareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173
3. Kenneth A. Lambert, "The Fundamentals of Python: First Programs", Cengage Learning, ISBN: 978-1111822705.
4. Guido Van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
5. Jake VanderPlas "Python Data Science Handbook" O'Reilly Publications
6. David Beazley, "Python Essential Reference (4th Edition) "Addison Wesley
7. Vernon L. Ceder," The Quick Python Book, Second Edition", Manning Publications

Online Resources

1. https://archive.nptel.ac.in/courses/106/106/106106182/
2. https://mrcet.com/downloads/digital_notes/CSE/III%20Year/PYTHON%20PROGRAMMING%20NOTES.pdf
3. https://python-iitk.vlabs.ac.in/

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CO1	2	3	3	2	2	1	2		2	3	1	1	3	3
CO2	2	2	1		2	1	2		2	2		2	2	2