File Ref.No.170385/GA - IV - J1/2026/Admn

UNIVERSITY OF CALICUT

Abstract

General & Academic IV - Faculty of Science - Scheme and Syllabus (Major & General Foundation Courses) of I to IV semesters of B.Sc Cyber Security Honours programme w.e.f 2025 admission - in tune with CUFYUGP Regulations 2024 - Approved by the Vice Chancellor - Implemented - Orders Issued

G & A - IV - J

U.O.No. 10624/2026/Admn Dated, Calicut University.P.O, 31.07.2026

Read:-1. U.O.No. 14633/2025/Admn dated: 18.10.2025

2. Item no. 9 of the minutes of the meeting of the Board of Studies in Computer Science and Application (UG) held on 29.06.2026

3. Remarks of the Dean, Faculty of Science dated: 28.07.2026

ORDER

1. Vide paper read as (1), the Scheme and I & II semester syllabus (Major Courses) of B.Sc Cyber Security Honours programme in tune with CUFYUGP Regulations 2024, was implemented with effect from 2025 admission
2. The Board of Studies in Computer Science and Application (UG), vide paper read (2), recommended to approve the scheme and syllabus (Major & General Foundation Courses) of I to IV semesters of B.Sc Cyber Security Honours programme w.e.f 2025 admission, in tune with CUFYUGP Regulations 2024.
3. The Dean, Faculty of Science, vide paper read (3), approved the recommendation of the Board of Studies in Computer Science and Application (UG).
4. Considering the urgency, the Vice Chancellor has approved the recommendation of the Board of Studies in Computer Science and Application (UG) and accorded sanction to implement the scheme and syllabus (Major & General Foundation Courses) of I to IV semesters of the B.Sc Cyber Security Honours programme w.e.f 2025 admission, in tune with CUFYUGP Regulations 2024, under section 10(13) of Calicut University Act 1975.
5. The scheme and syllabus (Major & General Foundation Courses) of of I to IV semesters of the B.Sc Cyber Security Honours programme in tune with CUFYUGP Regulations 2024, are implemented with effect from 2025 admission. (Syllabus appended)

Ajayakumar T.K

Assistant Registrar

To

The Principals of all Affiliated Colleges

Copy to: PS to VC/PA to PVC/ PA to Registrar/PA to CE/JCE I/JCE II/JCE IV/DoA/EX and EG Sections/GA I F/CHMK Library/SUVEGA/FYUGP Cell/SF/DF/FC

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

THENHIPALAM, CALICUT UNIVERSITY P.O

B.SC CYBER SECURITY HONOURS

Scheme & Syllabus
w.e.f 2025 Admission

CUFYUGP Regulations 2024

Board of Studies in Computer Science and Application (UG)

B.Sc. CYBER SECURITY HONOURS

SCHEME & SYLLABUS

I to IV semesters
(Major & General Foundation Courses)

w.e.f 2025 Admission

PROGRAMME OUTCOMES (PO):

At the end of the graduate programme at Calicut University, a student would comprehend and complete programme outcomes, such as

PROGRAM OUTCOMES (PO)

PO 1	**Design** innovative solutions for addressing challenges in cyberspace, ensuring the highest standards of data security.
PO 2	**Apply** scientific principles to analyze and solve cybersecurity issues, fostering a scientific outlook in the field.
PO 3	**Evaluate** complex cybersecurity problems using principles of applied sciences and cyber technologies to recommend effective solutions.
PO 4	**Formulate** strategic and structured approaches to resolve issues in the domain of cybersecurity.
PO 5	**Analyze** cybersecurity data to extract insights, interpret findings, and make evidence-based decisions.
PO 6	**Develop** ethical and socially responsible solutions to address cybersecurity challenges, contributing to societal well-being.
PO 7	**Demonstrate** adherence to ethical, moral, and social values to cultivate responsible and informed global netizenship.

PROGRAMME SPECIFIC OUTCOMES (PSO):

At the end of the BSc Cyber Security (Honours) programme at Calicut University, a student would:

PSO 1	**Analyze** diverse aspects of cyber and information security by employing scientific methods, advanced software tools, and specialized instrumentation in cyber forensic investigations.
PSO 2	**Demonstrate** an understanding of cyberspace functionalities and implement effective measures for securing cyber information and data.
PSO 3	**Distinguish** among various methods, protocols, and evaluative procedures essential for the investigative processes in solving cybercrimes, and **document** findings in compliance with established norms.
PSO 4	**Apply** established forensic principles to conduct investigations systematically, utilizing a step-by-step approach in developing investigative procedures.
PSO 5	**Evaluate** and **design** cyber forensic investigation protocols tailored to specific cybercrimes, incorporating evidence collection, evaluative techniques, and solutions aligned with applicable laws and justice systems.

MINIMUM CREDIT REQUIREMENTS OF THE DIFFERENT PATHWAYS IN THE THREE-YEAR PROGRAMME IN CUFYUGP

Sl. No.	Academic Pathway	Major	Minor/ Other Disciplines	Foundation Courses AEC: 4 MDC: 3 SEC: 3 VAC: 3	Intern -ship	Total Credits	Example
		Each course has 4 credits		Each course has 3 credits			
1	Single Major (A)	68 (17 courses)	24 (6 courses)	39 (13 courses)	2	133	Major: Cyber Security + six courses in different disciplines in different combinations
2	Major (A) with Multiple Disciplines (B, C)	68 (17 courses)	12 + 12 (3 + 3 = 6 courses)	39 (13 courses)	2	133	Major: Cyber Security + Digital Forensic and Cloud Computing
3	Major (A) with Minor (B)	68 (17 courses)	24 (6 courses)	39 (13 courses)	2	133	Major: Cyber Security Minor: Networking
4	Major (A) with Vocational Minor (B)	68 (17 courses)	24 (6 courses)	39 (13 courses)	2	133	Major: Cyber Security Minor: Block Chain
5	Double Major (A, B)	A: 48 (12 courses) B: 44 (11 courses)	-	12 + 18 + 9	2	133	Cyber Security and and Artificial Intelligence
			The 24 credits in the Minor stream are distributed between the two Majors. 2 MDC, 2 SEC, 2 VAC and the Internship should be in Major A. Total credits in Major A should be 48 + 20 = 68 (50% of 133) 1 MDC, 1 SEC and 1 VAC should be in Major B. Total credits in Major B should be 44 + 9 = 53 (40% of 133)				

Exit with UG degree / Proceed to fourth year with 133 credits

B.Sc. CYBER SECURITY (HONOURS) PROGRAMME COURSE STRUCTURE FOR PATHWAYS 1 – 4

1. Single Major
2. Major with Multiple Disciplines
3. Major with Minor
4. Major with Vocational Minor

Semester	Course Code	Course Title	Total Hours	Hours/ Week	Credits	Marks		
						Internal	External	Total
1	CYS1CJ101/ CYS1MN100	Fundamentals of Computers & Computational Thinking	75	5	4	30	70	100
		Minor Course 1	75	5	4	30	70	100
		Minor Course 2	75	5	4	30	70	100
	ENG1FA101 (2)	Ability Enhancement Course 1	60	4	3	25	50	75
	XXX1FA102 (2)	Ability Enhancement Course 2	45	3	3	25	50	75
	XXX1FM105	Multi-Disciplinary Course 1	45	3	3	25	50	75
		Total		**25**	**21**			**525**
2	CYS2CJ101/ CYS2MN100	Introduction to Cybersecurity and Digital Literacy	75	5	4	30	70	100
		Minor Course 3	75	5	4	30	70	100
		Minor Course 4	75	5	4	30	70	100
	ENG2FA103 (2)	Ability Enhancement Course 3	60	4	3	25	50	75
	XXX2FA104 (2)	Ability Enhancement Course 4	45	3	3	25	50	75
	XXX2FM106	Multi-Disciplinary Course 2	45	3	3	25	50	75
		Total		**25**	**21**			**525**
3	CYS3CJ201	Mathematical Foundation	60	4	4	30	70	100
	CYS3CJ202/ CYS3MN200	Data Structures and Algorithm	75	5	4	30	70	100
		Minor Course 5	75	5	4	30	70	100
		Minor Course 6	75	5	4	30	70	100
	XXX3FM107 (2)	Multi-Disciplinary Course 3 – Kerala Knowledge System	45	3	3	25	50	75
	ENG3FV108 (2)	Value-Added Course 1	45	3	3	25	50	75
		Total		**25**	**22**			**550**
4	CYS4CJ203	Object Oriented Programming in Java	75	5	4	30	70	100

	CYS4CJ204	Data Base Management System	75	5	4	30	70	100
	CYS4CJ205	Computer Networks	75	5	4	30	70	100
	ENG4FV109 (2)	Value-Added Course 2	45	3	3	25	50	75
	XXX4FV110(2)	Value-Added Course 3	45	3	3	25	50	75
	ENG4FS111 (2)	Skill Enhancement Course – 1 (P)	60	4	3	25	50	75
		Total		**25**	**21**			**525**
5	CYS5CJ301	Python Programming	75	5	4	30	70	100
	CYS5CJ302	Operating System	75	5	4	30	70	100
	CYS5CJ303	Fundamentals of Criminology and Cyber Criminology	60	4	4	30	70	100
		Elective Course 1 in Major	60	4	4	30	70	100
		Elective Course 2 in Major	60	4	4	30	70	100
	CYS5FS112	Skill Enhancement Course 2 - Introduction to Digital Marketing	45	3	3	25	50	75
		Total		**25**	**23**			**575**
6	CYS6CJ304/ CYS8MN304	Secure Software Development	75	5	4	30	70	100
	CYS6CJ305/ CYS8MN305	Mobile and Web Application Security	75	5	4	30	70	100
	CYS6CJ306/ CYS8MN306	Cyber Laws and Intellectual Property Rights	60	4	4	30	70	100
		Elective Course 3 in Major	60	4	4	30	70	100
		Elective Course 4 in Major	60	4	4	30	70	100
	CYS6FS113	Skill Enhancement Course 3 - Project Implementation	45	3	3	25	50	75
	CYS6CJ349	Internship in Major (Credit for internship to be awarded only at the end of Semester 6)	60		2	50	-	50
		Total		**25**	**25**			**625**
Total Credits for Three Years					**133**			**3325**
7	CYS7CJ401	Basics of Ethical Hacking	75	5	4	30	70	100
	CYS7CJ402	Information Security and Audit	60	4	4	30	70	100
	CYS7CJ403	Security analysis and Reporting	60	4	4	30	70	100
	CYS7CJ404	Cryptography	60	4	4	30	70	100
	CYS7CJ405	Cyber Forensics and Investigation	75	5	4	30	70	100
		Total		**25**	**20**			**500**

8	CYS8CJ406/ CYS8MN406	Security Architecture and Designs	60	4	4	30	70	100
	CYS8CJ407/ CYS8MN407	Cyber Risk Management	60	4	4	30	70	100
	CYS8CJ408/ CYS8MN408	Firewall and Internet Security	60	4	4	30	70	100
	OR (instead of Core Courses 19 - 21 in Major)							
	CYS8CJ449**	Project (in Honours programme)	360	13	12	90	210	300
	CYS8CJ499**	Research Project (in Honours with Research programme)	360	13	12	90	210	300
		Elective course 5	60	4	4	30	70	100
		Elective course 6	60	4	4	30	70	100
		Elective course 7	60	4	4	30	70	100
	OR (instead of Elective Course 7 in Major, in the case of Honours with Research Programme)							
	CYS8CJ 489	Research Methodology	60	4	4	30	70	100
		Total		**25**	**24**			**600**
Total Credits for Four Years					**177**			**4425**

Choose any four elective courses (two in fifth and two in sixth semester) from the basket of electives with specialization

Choose three elective courses in semester 8 from elective basket with no specialization

CREDIT DISTRIBUTION FOR PATHWAYS 1 – 4

1. Single Major
2. Major with Multiple Disciplines
3. Major with Minor
4. Major with Vocational Minor

Semester	Major Courses	Minor Courses	General Foundation Courses	Internship/ Project	Total
1	4	4 + 4	3 + 3 + 3	-	21
2	4	4 + 4	3 + 3 + 3	-	21
3	4 + 4	4 + 4	3 + 3	-	22
4	4 + 4 + 4	-	3 + 3 + 3	-	21
5	4 + 4 + 4 + 4 + 4	-	3	-	23
6	4 + 4 + 4 + 4 + 4	-	3	2	25
Total for Three Years	**68**	**24**	**39**	**2**	**133**
7	4 + 4 + 4 + 4 + 4	-	-	-	20
8	4 + 4 + 4	4 + 4 + 4	-	12	24
Total for Four Years	**88 + 12 = 100**	**36**	**39**	**2**	**177**

DISTRIBUTION OF MAJOR COURSES IN CYBER SECURITY FOR PATHWAYS 1 – 4

1. Single Major
2. Major with Multiple Disciplines
3. Major with Minor
4. Major with Vocational Minor

Semester	Course Code	Course Title	Hours / Week	Credits
1	CYS1CJ101/ CYS1MN100	Fundamentals of Computers & Computational Thinking	5	4
2	CYS2CJ101/ CYS2MN100	Introduction to Cybersecurity and Digital Literacy	5	4
3	CYS3CJ201	Mathematical Foundation	4	4
	CYS3CJ202/ CYS3MN200	Data Structures and Algorithm	5	4
4	CYS4CJ203	Object Oriented Programming in java	5	4
	CYS4CJ204	Data Base Management System	5	4
	CYS4CJ205	Computer Networks	5	4
5	CYS5CJ301	Python Programming	5	4
	CYS5CJ302	Operating System	5	4
	CYS5CJ303	Fundamentals of Criminology and Cyber	4	4

		Criminology		
		Elective Course 1	4	4
		Elective Course 2	4	4
6	CYS6CJ304/ CYS8MN304	Secure Software Development	5	4
	CYS6CJ305/ CYS8MN305	Mobile and Web Application Security	5	4
	CYS6CJ306/ CYS8MN306	Cyber Laws and Intellectual Property Rights	4	4
		Elective Course 3	4	4
		Elective Course 4	4	4
	CYS6CJ349	Internship in Major	-	2
Total for the Three Years				**70**
7	CYS7CJ401	Basics of Ethical Hacking	5	4
	CYS7CJ402	Information Security and Audit	4	4
	CYS7CJ403	Security analysis and Reporting	4	4
	CYS7CJ404	Cryptography	4	4
	CYS7CJ405	Cyber Forensics and Investigation	5	4
8	CYS8CJ406/ CYS8MN406	Security Architecture and Designs	4	4
	CYS8CJ407/ CYS8MN407	Cyber Risk Management	4	4
	CYS8CJ408/ CYS8MN408	Firewall and Internet Security	4	4
	OR (instead of Core Courses 19-21 in Major)			
		Elective course 5	4	4
		Elective course 6	4	4
		Elective course 7	4	4
	CYS8CJ449*	Project Work (in Honours Programme)	13	12
	CYS8CJ499**	Research Project (in Honours with Research Programme)	13	12
	OR (instead of Elective Course 7 in Major, in the case of Honours with Research Programme)			
	CYS8CJ 489	Research Methodology	4	4
Total for the Four Years				**114**

ELECTIVE COURSES IN CYBER SECURITY WITH SPECIALISATION

Group 1: Network Security and Forensics

Group No.	Sl. No.	Course Code	Title	Semester	Total Hrs	Hrs/Week	Credits	Marks
	1	CYS5EJ301(1)	Network Security Fundamentals	5	60	4	4	30
	2	CYS5EJ302(1)	Ethical Hacking and Penetration Testing	5	60	4	4	30
	3	CYS6EJ301(1)	Advanced Network Defense	6	60	4	4	30
	4	CYS6EJ302(1)	Zero Trust Security Architecture	6	60	4	4	30

Group 2: Cloud Security

Group No.	Sl. No.	Course Code	Title	Semester	Total Hrs	Hrs/Week	Credits	Marks
	1	CYS5EJ303(2)	Cloud Security Fundamentals	5	60	4	4	30
	2	CYS5EJ304(2)	Identity and Access Management	5	60	4	4	30
	3	CYS6EJ303(2)	Secure DevOps in Cloud Environments	6	60	4	4	30
	4	CYS6EJ304(2)	Cloud Threat Intelligence	6	60	4	4	30

General Electives (Without Specialization)

Sl. No.	Course Code	Title	Semester	Total Hrs	Hrs/Week	Credits	Marks
1	CYS8EJ401	Modern Cryptography	8	60	4	4	30
2	CYS8EJ402	Blockchain Security	8	60	4	4	30
3	CYS8EJ403	Big Data Security	8	60	4	4	30
4	CYS8EJ404	Mobile and IoT Security	8	60	4	4	30
5	CYS8EJ405	Incident Response and Threat Hunting	8	60	4	4	30
6	CYS8EJ406	Artificial Intelligence in Cybersecurity	8	60	4	4	30

DISTRIBUTION OF GENERAL FOUNDATION COURSES IN CYBER SECURITY

Semester	Course Code	Course Title	Total Hours	Hours/ Week	Credits	Marks		
						Internal	External	Total
1	CYS1FM105	Data Analysis and Visualization Through Spread Sheet	45	3	3	25	50	75
2	CYS2FM106	Digital Empowerment Through Ethical Standards	45	3	3	25	50	75
3	CYS3FV108	Introduction to cyber laws	45	3	3	25	50	75
4	CYS4FV110	Professional Skill Development for IT Career Excellence	45	3	3	25	50	75
5	CYS5FS112	Introduction to Digital Marketing	45	3	3	25	50	75
6	CYS6FS113	Project Implementation	45	3	3	25	50	75

COURSE STRUCTURE FOR BATCH A1(B2) IN PATHWAY 5: DOUBLE MAJOR

A1: 68 credits in Cyber Security ***(Major A)*** ***B1: 68 credits in Major B***

A2: 53 credits in Cyber Security***(Major A)*** ***B2: 53 credits in Major B***

The combinations available to the students: (A1 & B2), (B1 & A2)

Note: Unless the batch is specified, the course is for all the students of the class

Semester	Course Code	Course Title	Total Hours	Hours/ Week	Credits	Marks		
						Internal	External	Total
1	CYS1CJ101 / CYS1MN100	Fundamentals of Computers & Computational Thinking	75	5	4	30	70	100
	XXX1CJ101	Core Course 1 in Major B –	60/ 75	4/ 5	4	30	70	100
	CYS1CJ102 / CYS2CJ102 / CYS4CJ203*	Object Oriented Programming in java	75	5	4	30	70	100
	ENG1FA101 (2)	Ability Enhancement Course 1	60	4	3	25	50	75
	XXX1FA102(2)	Ability Enhancement Course 2	45	3	3	25	50	75

	CYS1FM105	Multi-Disciplinary Course 1 – Data Analysis and Visualization Through Spreadsheet	45	3	3	25	50	75
		Total		**24/ 25**	**21**			**525**
2	CYS2CJ101 / CYS2MN100	Introduction to Cybersecurity and Digital Literacy	75	5	4	30	70	100
	XXX2CJ101	Core Course 2 in Major B –	60/ 75	4/ 5	4	30	70	100
	XXX2CJ102 / XXX1CJ102	Core Course 3 in Major B – (for batch B2 only)	60/ 75	4/ 5	4	30	70	100
	ENG2FA103 (2)	Ability Enhancement Course 3	60	4	3	25	50	75
		Ability Enhancement Course 4	45	3	3	25	50	75
	CYS2FM106/ CYS3FM106	Multi-Disciplinary Course 2 – Digital Empowerment Through Ethical Standards	45	3	3	25	50	75
		Total		**23 – 25**	**21**			**525**
3	CYS3CJ201	Mathematical Foundation	60	4	4	30	70	100
	CYS3CJ202/ CYS3MN200	Data Structures and Algorithm	75	5	4	30	70	100
	XXX3CJ201	Core Course 4 in Major B	60/ 75	4/ 5	4	30	70	100
	XXX3CJ202	Core Course 5 in Major B	60/ 75	4/ 5	4	30	70	100
	XXX3FM106	Multi-Disciplinary Course 1 in B –	45	3	3	25	50	75
	CYS3FV108	Value-Added Course 1 Introduction to cyber laws	45	3	3	25	50	75
		Total		**23 – 25**	**22**			**550**
4	CYS4CJ204	Data Base Management System	75	5	4	30	70	100
	XXX4CJXXX	Core Course 6 in Major B	60/ 75	4/ 5	4	30	70	100
	CYS4CJ205	Computer Networks	75	5	4	30	70	100
	CYS4FV110	Value-Added Course 2 Professional Skill Development for IT Career Excellence	45	3	3	25	50	75
	XXX4FV110	Value-Added Course 1 in B	45	3	3	25	50	75
	CYS4FS112/ CYS5FS112	Skill Enhancement Course 1 Introduction to Digital Marketing	45	3	3	25	50	75

		Total		**23/ 24**	**21**			**525**
5	CYS5CJ302	Operating System	75	5	4	30	70	100
	XXX5CJXXX	Core Course 7 in Major B –	60/ 75	4/ 5	4	30	70	100
	CYS5CJ303	Fundamentals of Criminology and Cyber Criminology	60	4	4	30	70	100
		Elective Course 1 in Major	60	4	4	30	70	100
		Elective Course 1 in Major B	60	4	4	30	70	100
	XXX5FSXXX	Skill Enhancement Course 1 in B	45	3	3	25	50	75
		Total		**24/ 25**	**23**			**575**
6	CYS6CJ305/ CYS8MN305	Major – Mobile and Web Application Security	75	5	4	30	70	100
	XXX6CJXXX	Core Course 8 in Major B –	60/ 75	4/ 5	4			
	XXX6CJXXX	Core Course 9 in Major B – (for batch B2 only)	60	4	4	30	70	100
		Elective Course 2 in Major	60	4	4	30	70	100
	XXX6EJXXX	Elective Course 2 in Major B	60	4	4	30	70	100
	CYS6FS113	Skill Enhancement Course 3 – Project Implementation	45	3	3	25	50	75
	CYS6CJ349	Internship in Major Cyber Security (Credit for internship to be awarded only at the end of Semester 6)	60		2	50	-	50
		Total		**24/ 25**	**25**			**625**
Total Credits for Three Years					**133**			**3325**
For batch A1(B2), the course structure in semesters 7 and 8 is the same as for pathways 1 – 4, except that the number of the core and elective courses is in continuation of the number of courses in the two categories completed at the end of semester 6.								

* The course code of the same course as used for the pathways 1 – 4

CREDIT DISTRIBUTION FOR BATCH A1(B2) IN PATHWAY 5: DOUBLE MAJOR

Semester	Major Courses in Cyber Security	General Foundation Courses in Cyber Security	Internship/ Project in Cyber Security	Major Courses in B	General Foundation Courses in B	AEC	Total
1	4 + 4	3	-	4	-	3 + 3	21
2	4	3	-	4 + 4	-	3 + 3	21
3	4 + 4	3	-	4 + 4	3	-	22
4	4 + 4	3 + 3	-	4	3	-	21
5	4 + 4 + 4	-	-	4 + 4	3	-	23
6	4 + 4	3	2	4 + 4 + 4	-	-	25
Total for Three Years	**48**	**18**	**2**	**44**	**9**	**12**	**133**
	68			**53**		**12**	**133**
	Major Courses in Cyber Security	Minor Courses					
7	4 + 4 + 4 + 4 + 4	-			-	-	20
8	4 + 4 + 4	4 + 4 + 4	12		-	-	24
Total for Four Years	**88 + 12 = 100**	**12**					**177**

COURSE STRUCTURE FOR BATCH B1(A2) IN
PATHWAY 5: DOUBLE MAJOR

A1: 68 credits in Cyber Security***(Major A)*** ***B1: 68 credits in Major***

B A2: 53 credits in Cyber Security***(Major A)*** ***B2: 53 credits in Major B***

The combinations available to the students: (A1 & B2), (B1 & A2)

Note: Unless the batch is specified, the course is for all the students of the class

Semester	Course Code	Course Title	Total Hours	Hours / Week	Credits	Marks		
						Internal	External	Total
1	**XXX**1CJ101	Core Course 1 in Major B –	75	5	4	30	70	100
	CYS1CJ101/ CYS1MN100	Fundamentals of Computers & Computational Thinking	75	5	4	30	70	100
	XXX1CJ 102 / XXX2CJ 102	Core Course 2 in Major B – (for batch B1 only)	60/ 75	4/ 5	4	30	70	100
	ENG1FA101(2)	Ability Enhancement Course – 1 (P) (E)	60	4	3	25	50	75
	XXX1FA102(2)	Ability Enhancement Course – 2 (AL)	45	3	3	25	50	75
	XXX1FM 105	Multi-Disciplinary Course 1 in B – (for batch B1 only)	45	3	3	25	50	75
		Total		**23 – 25**	**21**			**525**
2	XXX2CJ101	Core Course 2 in Major B –	75	5	4	30	70	100
	CYS2CJ101/ CYS2MN100	Introduction to Cybersecurity and Digital Literacy	75	5	4	30	70	100
	CYS2C J202 / CYS1C J102 / CYS4C J203	Object Oriented Programming in java	75	5	4	30	70	100
	ENG2FA107(2)	Ability Enhancement Course – 3 (P) (E)	60	4	3	25	50	75
	XXX2FA108(2)	Ability Enhancement Course – 4 (AL)	45	3	3	25	50	75

	XXX2FM 106 / XXX3FM 106	Multi-Disciplinary Course 1	45	3	3	25	50	75
		Total		**24/ 25**	**21**			**525**
3	XXX3CJ203	Core Course 4 in Major B	60	4	4	30	70	100
	XXX3CJ202	Core Course 5 in Major B	75	5	4	30	70	100
	CYS3CJ201	Mathematical Foundation	60	4	4	30	70	100
	CYS3CJ202/ CYS3MN200	Data Structures and Algorithm	75	5	4	30	70	100
	XXX3FM 106 / XXX2FM 106	Multi-Disciplinary Course 2 in B –	45	3	3	25	50	75
	XXX3FV 108	Value-Added Course 1 in B – (for batch B1 only)	45	3	3	25	50	75
		Total		**23 – 25**	**22**			**550**
4	CYS4CJ205	Computer Networks	75	5	4	30	70	100
	XXX4CJXXX	Core Course 6 in Major B	60/ 75	4/ 5	4	30	70	100
	XXX4CJXXX	Core Course 7 in Major B – (for batch B1 only)	60/ 75	4/ 5	4	30	70	100
	CYS4FV 110	Value-Added Course 1 Professional Skill Development for IT Career Excellence	45	3	3	25	50	75
	XXX4FV 110	Value-Added Course 2 in B –	45	3	3	25	50	75
	CYS4FS 112/ CYS5FS112	Skill Enhancement Course Introduction to Digital Marketing	45	3	3	25	50	75
		Total		**22 – 24**	**21**			**525**
5	CYS5CJ 302	Major A Operating System	75	5	4	30	70	100

	XXX5CJXXX	Core Course 8 in Major B –	60/ 75	4/ 5	4	30	70	100
	XXX5CJXXX	Core Course 9 in Major B – (for batch B1 only)	60	4	4	30	70	100
		Elective Course 1 in Major A	60	4	4	30	70	100
		Elective Course 1 in Major B	60	4	4	30	70	100
	XXX5FS 112 / XXX4FS 112	Skill Enhancement Course 1 in B	45	3	3	25	50	75
		Total		**24/ 25**	**23**			**575**
6	CYS6CJ 305/ CYS8MN305	Major A Mobile and Web Application Security	75	5	4	30	70	100
	XXX6CJXXX	Core Course 10 in Major B –	60/ 75	4/ 5	4	30	70	100
	CYS6CJ 306/ CYS8MN306	Major A Cyber Laws and Intellectual Property Rights (for batch A2 only)	60	4	4	30	70	100
		Elective Course 2 in Major A	60	4	4	30	70	100
		Elective Course 2 in Major B	60	4	4	30	70	100
	XXX6FS 113	Skill Enhancement Course 2 in B (for batch B1 only)	45	3	3	25	50	75
	XXX6CJ 349	Internship in Major B (Credit for internship to be awarded only at the end of Semester 6)	60		2	50	-	50
		Total		**24/ 25**	**25**			**625**
Total Credits for Three Years					**133**			**3325**

To continue to study cyber Security in semesters 7 and 8, batch B1(A2) needs to earn additional 15 credits in Cyber Security to make the total credits of 68. Suppose this condition is achieved, and the student of batch B1(A2) proceeds to the next semesters to study cyber Security. The course structure in semesters 7 and 8 is the same as for pathways 1 – 4, except that the number of the core and elective courses is in continuation of the number of courses in the two categories completed at the end of semester 6, taking into
account the number of courses in Cyber Security taken online to earn the additional 15 credits.

EVALUATION SCHEME

1. The evaluation scheme for each course contains two parts: internal evaluation (about 30%) and external evaluation (about 70%). Each of the Major and Minor courses is of 4-credits. It is evaluated for 100 marks, out of which 30 marks is from internal evaluation and 70 marks, from external evaluation. Each of the General Foundation course is of 3 -credits. It is evaluated for 75 marks, out of which 25 marks is from internal evaluation and 50 marks, from external evaluation.
2. The 4-credit courses (Major and Minor courses) are of two types: (i) courses with only theory and (ii) courses with 3-credit theory and 1-credit practical.

    - In 4-credit courses with only theory component, out of the total 5 modules of the syllabus, one open-ended module with 20% content is designed by the faculty member teaching that course, and it is internally evaluated for 10 marks. The internal evaluation of the remaining 4 theory modules is for 20 marks.
    - In 4-credit courses with 3-credit theory and 1-credit practical components, out of the total 5 modules of the syllabus, 4 modules are for theory and the fifth module is for practical. The practical component is internally evaluated for 20 marks. The internal evaluation of the 4 theory modules is for 10 marks.
3. All the 3-credit courses (General Foundational Courses) in Cyber Security are with only theory component. Out of the total 5 modules of the syllabus, one open-ended module with 20% content is designed by the faculty member teaching that course, and it is internally evaluated for 5 marks. The internal evaluation of the remaining 4 theory modules is for 20 marks.

Sl. No.	Nature of the Course		Internal Evaluation in Marks (about 30% of the total)		External Exam on 4 modules (Marks)	Total Marks
			Open-ended module / Practical	On the other 4 modules		
1	4-credit course	only theory (5 modules)	10	20	70	100
2	4-credit course	Theory (4 modules) + Practical	20	10	70	100
3	3-credit course	only theory (5 modules)	5	20	50	75

1. MAJOR AND MINOR COURSES

1.1. INTERNAL EVALUATION OF THEORY COMPONENT

Sl. No.	Components of Internal Evaluation of Theory Part of a Major / Minor Course	Internal Marks for the Theory Part of a Major / Minor Course of 4-credits			
		Theory Only		Theory + Practical	
		4 Theory Modules	Open-ended Module	4 Theory Modules	Practical
1	Test paper/ Mid-semester Exam	10	4	5	-
2	Seminar/ Viva/ Quiz	6	4	3	-
3	Assignment	4	2	2	-
Total		20	10	10	20*
		30		30	

* Refer the table in section 1.2 for the evaluation of practical component

1.2. EVALUATION OF PRACTICAL COMPONENT

The evaluation of practical component in Major and Minor courses is completely by internal evaluation.

- Continuous evaluation of practical by the teacher-in-charge shall carry a weightage of 50%.
- The end-semester practical examination and viva-voce, and the evaluation of practical records shall be conducted by the teacher in-charge and an internal examiner appointed by the

Department Council.

- The process of continuous evaluation of practical courses shall be completed before 10 days from the commencement of the end-semester examination.
- Those who passed in continuous evaluation alone will be permitted to appear for the end-semester examination and viva-voce.

The scheme of continuous evaluation and the end-semester examination and viva-voce of practical component shall be as given below:

Sl. No.	Evaluation of Practical Component of Credit-1 in a Major / Minor Course	Marks for Practical	Weightage
1	Continuous evaluation of practical/ exercise performed in practical classes by the students	10	50%
2	End-semester examination and viva-voce to be conducted by teacher-in-charge along with an additional examiner arranged internally by the Department Council	7	35%
3	Evaluation of the Practical records submitted for the end semester viva–voce examination by the teacher-in-charge and additional examiner	3	15%
	Total Marks	20	

1.3. EXTERNAL EVALUATION OF THEORY COMPONENT

External evaluation carries 70% marks. Examinations will be conducted at the end of each semester. Individual questions are evaluated in marks and the total marks are converted into grades by the University based on 10-point grading system (refer section 5).

PATTERN OF QUESTION PAPER FOR MAJOR AND MINOR COURSES

Duration	Type	Total No. of Questions	No. of Questions to be Answered	Marks for Each Question	Ceiling of Marks
2 Hours	Short Answer	10	8 – 10	3	24
	Paragraph/ Problem	8	6 – 8	6	36
	Essay	2	1	10	10
				Total Marks	70

2. INTERNSHIP

- All students should undergo Internship of 2-credits during the first six semesters in a firm, industry or organization, or training in labs with faculty and researchers of their own institution or other Higher Educational Institutions (HEIs) or research institutions.
- Internship can be for enhancing the employability of the student or for developing the research aptitude.
- Internship can involve hands-on training on a particular skill/ equipment/ software. It can be a short project on a specific problem or area. Attending seminars or workshops related to an area of learning or skill can be a component of Internship.
- A faculty member/ scientist/ instructor of the respective institution, where the student does the Internship, should be the supervisor of the Internship.

2.1. GUIDELINES FOR INTERNSHIP

1. Internship can be in Cyber Security or allied disciplines.
2. There should be minimum 60 hrs. of engagement from the student in the Internship.
3. Summer vacations and other holidays can be used for completing the Internship.
4. In BSc. Cyber Security (Honours) programme, institute/ industry visit or study tour is a requirement for the completion of Internship. Visit to minimum one national research institute, research laboratory and place of scientific importance should be part of the study tour. A brief report of the study tour has to be submitted with photos and analysis.
5. The students should make regular and detailed entries in to a personal log book through the period of Internship. The log book will be a record of the progress of the Internship and the time spent on the work, and it will be useful in writing the final report. It may contain experimental conditions and results, ideas, mathematical expressions, rough work and calculation, Computer file names etc. All entries should be dated. The Internship supervisor should periodically examine and countersign the log book.
6. The log book and the typed report must be submitted at the end of the Internship.
7. The institution at which the Internship will be carried out should be prior-approved by the Department Council of the college where the student has enrolled for the UG (Honours) programme.

2.2. EVALUATION OF INTERNSHIP

- The evaluation of Internship shall be done internally through continuous assessment mode by a committee internally constituted by the Department Council of the college where the student has enrolled for the UG (Honours) programme.
- The credits and marks for the Internship will be awarded only at the end of semester 6.

- The scheme of continuous evaluation and the end-semester viva-voce examination based on the submitted report shall be as given below:

Sl. No.	Components of Evaluation of Internship		Marks for Internship 2 Credits	Weightage
1	Continuous evaluation of internship through interim presentations and reports by the committee internally constituted by the Department Council	Acquisition of skill set	10	40%
2		Interim Presentation and Viva-voce	5	
3		Punctuality and Log Book	5	
4	Report of Institute Visit/ Study Tour		5	10%
5	End-semester viva-voce examination to be conducted by the committee internally constituted by the Department Council	Quality of the work	6	35%
6		Presentation of the work	5	
7		Viva-voce	6	
8	Evaluation of the day-to-day records, the report of internship supervisor, and final report submitted for the end semester viva–voce examination before the committee internally constituted by the Department Council		8	15%
	Total Marks		50	

3 MINI PROJECT WORK (Skill Enhancement Course 3 - CYIN6FS113

A mandatory mini-project (SEC 3) is scheduled in the VI Semester of the BSc CY (Honours) program. It is designed to cultivate students' research and software development skills. It will serve as a capstone experience, allowing students to bridge the gap between theoretical knowledge acquired in the classroom and its practical application to real-world problems

3.1 Project Selection and Approval:

- Student groups (at most four members) can propose projects in Cyber Security or related disciplines.
- Projects can be experimental (building a prototype), theoretical (a research paper), or computational (implementing an algorithm).
- Project proposals must be submitted for **prior approval** from the Department Council.
- Each project team will be assigned a project supervisor for guidance.

Project Duration:

- The mini-project duration is one semester.
- **Minimum engagement:** 90 hours per student.

Project Deliverables**:**

- Two hard copies and one softcopy of a well-structured typed report outlining:
    - Project objectives and requirements analysis
    - System design and architecture
    - Implementation details (including sample code snippets)
    - Test cases and results
    - Conclusion and future work
- A signed undertaking by the student declaring the originality of the work and the absence of plagiarism.
- A certificate from the project supervisor confirming the same.

3.2 Evaluation Criteria and Rubrics:

1. **Internal Evaluation (25 Marks) -** Conducted by the project supervisor throughout the semester. This could involve:
    - **Project Proposal and Planning**
        - Clarity of project goals and objectives.
        - Feasibility of the chosen approach.
        - Quality of system study/literature review and proposed methodology.
        - Clarity of project schedule and division of tasks within the team.
    - **Project Progress and Implementation**
        - Regular code reviews and adoption of feedback provided by the supervisor.
        - Attendance and active participation in project meetings.
        - Completion of project milestones as planned.
        - Quality of code documentation and adherence to coding standards.
    - **Interim Presentations**
        - Effectiveness of communication and presentation skills.
        - Clarity of technical details and progress made.
        - Ability to answer questions about the project effectively.

Sl. No	Components of Evaluation of Project	Marks for the Internal Evaluation of Mini project
1	Project Proposal and Planning	5
2	Project Progress and Implementation	10
3	Interim Presentations	10
	Total Marks	25

2. **External Evaluation (50 Marks) -** Conducted by an external examiner appointed by the University. This will take place at the end of the VIth semester:

- **Project Report:**
  - **Content:** Completeness, organisation, clarity, and technical accuracy.
  - **Structure:** Introduction, System Design/literature review, methodology, implementation details, results, discussion, conclusion, future work, and references.
  - **Presentation:** Quality of writing, grammar, and formatting.
- **Project Demonstration**
  - **Demonstration:** Ability to showcase the functionality of the project or present the research findings effectively.
- **Viva-voce**
  - **Viva-voce:** Understanding of project concepts, ability to answer questions confidently, and critical thinking skills.

Sl. No	Components of Evaluation of Project	Marks for the End Semester Evaluation of Mini project
1	Project Report	15
2	Project Demonstration	20
3	Viva-voce	15
Total Marks		50

4. PROJECT

4.1. PROJECT IN HONOURS PROGRAMME

- In Honours programme, the student has the option to do a Project of 12-credits instead of two Core Courses in Major in semester 8.
- The Project can be done in the same institution or any other higher educational institution (HEI) or research centre.
- A faculty member of the respective institution, where the student does the Project, should be the supervisor of the Project.

4.2. PROJECT IN HONOURS WITH RESEARCH PROGRAMME

- Students who secure 75% marks and above (equivalently, CGPA 7.5 and above) cumulatively in the first six semesters are eligible to get selected to Honours with Research stream in the fourth year.
- In Honours with Research programme, the student has to do a mandatory Research Project of 12-credits in semester 8.
- The approved research centres of University of Calicut or any other university/ HEI can offer

the Honours with Research programme. The departments in the affiliated colleges under University of Calicut, which are not the approved research centres of the University, should get prior approval from the University to offer the Honours with Research programme. Such departments should have minimum one faculty member with Ph.D., and they should also have the necessary infrastructure to offer Honours with Research programme.

- A faculty member of the University/ College with a Ph.D. degree can supervise the research project of the students who have enrolled for Honours with Research. One such faculty member can supervise maximum four students in Honours with Research stream.

4.3. GUIDELINES FOR THE PROJECT IN HONOURS PROGRAMME AND HONOURS WITH RESEARCH PROGRAMME

1. Project can be in Cyber Security or allied disciplines.
2. Project should be done individually.
3. Project work can be of experimental/ theoretical/ computational in nature.
4. There should be minimum 240 hrs. of engagement from the student in the Project work in Honours programme.
5. There should be minimum 360 hrs. of engagement from the student in the Project work in Honours with Research programme.
6. The various steps in project works are the following:
    - Wide review of a topic.
    - Investigation on a problem in systematic way using appropriate techniques.
    - Systematic recording of the work.
    - Reporting the results with interpretation in a standard documented form.
    - Presenting the results before the examiners.
7. During the Project the students should make regular and detailed entries in to a personal log book through the period of investigation. The log book will be a record of the progress of the Project and the time spent on the work, and it will be useful in writing the final report. It may contain experimental conditions and results, ideas, mathematical expressions, rough work and calculation, Computer file names etc. All entries should be dated. The Project supervisor should periodically examine and countersign the log book.
8. The log book and the typed report must be submitted at the end of the Project. A copy of the

report should be kept for reference at the department. A soft copy of the report too should be submitted, to be sent to the external examiner in advance.

9. It is desirable, but not mandatory, to publish the results of the Project in a peer reviewed journal.
10. The project report shall have an undertaking from the student and a certificate from the research supervisor for originality of the work, stating that there is no plagiarism, and that the work has not been submitted for the award of any other degree/ diploma in the same institution or any other institution.
11. The project proposal, institution at which the project is being carried out, and the project supervisor should be prior-approved by the Department Council of the college where the student has enrolled for the UG (Honours) programme.

4.4. EVALUATION OF PROJECT

- The evaluation of Project will be conducted at the end of the eighth semester by both internal and external modes.
- The Project in Honours programme/ Honours with Research programme will be evaluated for 300 marks. Out of this, 90 marks is from internal evaluation and 210 marks, from external evaluation.
- The internal evaluation of the Project work shall be done through continuous assessment mode by a committee internally constituted by the Department Council of the college where the student has enrolled for the UG (Honours) programme. 30% of the weightage shall be given through this mode.
- The remaining 70% shall be awarded by the external examiner appointed by the University.
- The scheme of continuous evaluation and the end-semester viva-voce of the Project shall be as given below:

Components of Evaluation of Project	Marks for the Research Project(Honours) / (Honours with Research) 12 Credits	Weightage
Continuous evaluation of project work through interim presentations and reports by the committee internally constituted by the Department Council	90	30%

End-semester viva-voce examination to be conducted by the external examiner appointed by the university	150	50%
Evaluation of the day-to-day records and project report submitted for the end-semester viva–voce examination conducted by the external examiner	60	20%
Total Marks	300	

INTERNAL EVALUATION OF PROJECT

Sl. No	Components of Evaluation of Project	Marks for the Research Project (Honours programme) /(Honours with Research programme) 12 credits
1	Skill in doing project work	30
2	Interim Presentation and Viva-Voce	20
3	Punctuality and Log book	20
4	Scheme/ Organization of Project Report	20
	Total Marks	90

EXTERNAL EVALUATION OF PROJECT

Sl. No	Components of Evaluation of Project	Marks for the Research Project (Honours programme) / (Honours with Research programme) 12 credits
1	Content and relevance of the Project, Methodology, Quality of analysis,	50

	and Innovations of Research	
2	Presentation of the Project	50
3	Project Report (typed copy), Log Book and References	60
4	Viva-Voce	50
	Total Marks	210

5. GENERAL FOUNDATION COURSES

- All the General Foundation Courses (3-credits) in B.Sc Cyber Securityare with only theory component.

5.1. INTERNAL EVALUATION

Sl. No.	Components of Internal Evaluation of a General Foundation Course in AI	Internal Marks of a General Foundation Course of 3-credits in AI	
		4 Theory Modules	Open-ended Module
1	Test paper/ Mid-semester Exam	10	2
2	Seminar/ Viva/ Quiz	6	2
3	Assignment	4	1
Total		20	5
		25	

5.2. EXTERNAL EVALUATION

External evaluation carries about 70% marks. Examinations will be conducted at the end of each semester. Individual questions are evaluated in marks and the total marks are converted into grades by the University based on 10-point grading system (refer section 5).

PATTERN OF QUESTION PAPER FOR GENERAL FOUNDATION COURSES

Duration	Type	Total No. of Questions	No. of Questions to be Answered	Marks for Each Question	Ceiling of Marks
1.5 Hours	Short Answer	10	8 – 10	2	16
	Paragraph/ Problem	5	4 – 5	6	24
	Essay	2	1	10	10
				Total Marks	50

6. LETTER GRADES AND GRADE POINTS

- Mark system is followed for evaluating each question.
- For each course in the semester letter grade and grade point are introduced in 10 -point

indirect grading system as per guidelines given below.

- The Semester Grade Point Average (SGPA) is computed from the grades as a measure of the student's performance in a given semester.
- The Cumulative GPA (CGPA) is based on the grades in all courses taken after joining the programme of study.
- Only the weighted grade point based on marks obtained shall be displayed on the grade card issued to the students.

LETTER GRADES AND GRADE POINTS

Sl. No.	Percentage of Marks (Internal & External Put Together)	Description	Letter Grade	Grade Point	Range of Grade Points	Class
1	95% and above	Outstanding	O	10	9.50 – 10	First Class with Distinction
2	Above 85% and below 95%	Excellent	A+	9	8.50 – 9. 49	
3	75% to below 85%	Very Good	A	8	7.50 – 8.49	
4	65% to below 75%	Good	B+	7	6.50 – 7.49	First Class
5	55% to below 65%	Above Average	B	6	5.50 – 6.49	
6	45% to below 55%	Average	C	5	4.50 – 5.49	Second Class
7	35% to below 45% aggregate (internal and external put together) with a minimum of 30% in external valuation	Pass	P	4	3.50 – 4.49	Third Class
8	Below an aggregate of 35%	Fail	F	0	0 – 3.49	Fail
	or below 30% in external evaluation					
9	Not attending the examination	Absent	Ab	0	0	Fail

- When students take audit courses, they will be given Pass (P) or Fail (F) grade without any credits.
- The successful completion of all the courses and capstone components prescribed for the three- year or four-year programme with 'P' grade shall be the minimum requirement for the award of UG Degree or UG Degree (Honours) or UG Degree (Honours with Research), as the case may be.

6.1. COMPUTATION OF SGPA AND CGPA

- The following method shall be used to compute the Semester Grade Point Average (SGPA):

The SGPA equals the product of the number of credits (Ci) with the grade points (Gi) scored by a student in each course in a semester, summed over all the courses taken by a student in the semester, and then divided by the total number of credits of all the courses taken by the student in the semester,

$$\text{i.e. SGPA (Si)} = \Sigma i\ (Ci \times Gi) / \Sigma i\ (Ci)$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course in the given semester. Credit Point of a course is the value obtained by multiplying the credit (Ci) of the course by the grade point (Gi) of the course.

$$\text{SGPA} = \frac{\text{Sum of the credit points of all the courses in a semester}}{\text{Total credits in that semester}}$$

ILLUSTRATION – COMPUTATION OF SGPA

Semester	**Course**	**Credit**	**Letter Grade**	**Grade point**	**Credit Point** (Credit x Grade)
I	Course 1	3	A	8	3 x 8 = 24
I	Course 2	4	B+	7	4 x 7 = 28
I	Course 3	3	B	6	3 x 6 = 18
I	Course 4	3	O	10	3 x 10 = 30
I	Course 5	3	C	5	3 x 5 = 15
I	Course 6	4	B	6	4 x 6 = 24
	Total	20			139
	SGPA				139/20 = 6.950

- The Cumulative Grade Point Average (CGPA) of the student shall be calculated at the end of a programme. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students.

  CGPA for the three-year programme in CUFYUGP shall be calculated by the following formula.

$$\text{CGPA} = \frac{\text{Sum of the credit points of all the courses in six semesters}}{\text{Total credits in six semesters (133)}}$$

CGPA for the four-year programme in CUFYUGP shall be calculated by the following formula.

$$\text{CGPA} = \frac{\text{Sum of the credit points of all the courses in eight semesters}}{\text{Total credits in eight semesters (177)}}$$

- The SGPA and CGPA shall be rounded off to three decimal points and reported in the transcripts.

* Based on the above letter grades, grade points, SGPA and CGPA, the University shall issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.The course code of the same course as used for the pathways 1 – 4

CREDIT DISTRIBUTION FOR BATCH B1(A2) IN PATHWAY 5: DOUBLE MAJOR

Semester	Major Courses in B	General Foundation Courses in B	Internship/ Project in B	Major Courses in Cyber Security e	General Foundation Courses in Cyber Security	AEC	Total
1	4 + 4	3	-	4	-	3 + 3	21
2	4	-	-	4 + 4	3	3 + 3	21
3	4 + 4	3 + 3	-	4 + 4	-	-	22
4	4 + 4	3	-	4	3 + 3	-	21
5	4 + 4 + 4	3	-	4 + 4	-	-	23
6	4 + 4	3	2	4 + 4 + 4	-	-	25
Total for Three Years	**48**	**18**	**2**	**44**	**9**	**12**	**133**
	68			**53**		**12**	**133**
	Major Courses in B	Minor Courses					
7	4 + 4 + 4 + 4 + 4	-			-	-	20
8	4 + 4 + 4	4 + 4 + 4	12		-	-	24
Total for Four Years	**88 + 12 = 100**	**12**					**177**

Detailed Syllabus for course specific to Cyber security stream

Programme	BSc Cyber Security Honours				
Course Title	Fundamentals of Computers and Computational Thinking				
Type of Course	Major				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3		2	75
Pre-requisites	1. Fundamentals of electronic components 2. Basic mathematical operations				
Course Summary	This course provides a comprehensive overview of computing, covering historical milestones, hardware components, software systems, and computational thinking principles. Students will explore the evolution of computing systems, from early pioneers to modern processors and quantum units. The curriculum delves into hardware intricacies, software distinctions, and essential concepts in computer science, emphasizing problem-solving skills and algorithmic thinking. Practical aspects include hands-on experiences with hardware assembling, operating system installation, algorithm and flowchart visualization.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Develop a foundational knowledge of computing systems, encompassing their historical development, evolutionary milestones, and the notable contributions of key figures in the field.	U	F	Instructor-created exams / Quiz
CO2	Acquire familiarity with diverse hardware components constituting a computer system.	U	C	Practical Assignment / Observation of Practical Skills
CO3	Gain practical expertise by engaging in hands-on activities focused on the installation and configuration of diverse hardware components within a computer system.	Ap	P	Practical Assignment / Observation of Practical Skills
CO4	Explore the spectrum of software types, and actively participate in the partitioning, installation, and configuration of operating systems to cultivate a comprehensive understanding of software systems.	Ap	P	Practical Assignment / Observation of Practical Skills
CO5	Develop a foundational understanding of computer science as a discipline, examining problems through the lens of computational thinking and cultivating analytical skills to address challenges in the field.	An	C	Instructor-created exams / Quiz

CO6	Represent complex problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of various software tools.	Ap	P	Practical Assignment / Observation of Practical Skills
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus

Module	Unit	Content	Hrs 75	Marks
I	**History and Evolution of Computing System**		**9**	**15**
	1	**Evolution of Computers** – History, Generations	2	
	2	**Overview of Computer System-** Von Neumann Model, Number Systems (Binary, Hexa, Octal, Decimal)	2	
	3	**Number Conversion and Digital Codes** - Conversion from one number system to another, Digital Codes (Gray, Excess-3, BCD)	2	
	4	**Pioneers and Contributors of Computing Systems** - First Mechanical computer - Charles Babbage, Stored-Program Architecture - John von Neumann, Turing machine - Alan Turing, First General-Purpose Electronic Digital Computer - John Mauchly and J. Presper Eckert, Artificial Intelligence- John McCarthy (Contributions only).	2	
	5	**Computing Systems: Past to Present** - Single Core, Dual-Core and Multi-Core Processors, Graphics Processing Unit (GPU), Accelerated Processing Unit, Quantum Processing Units (QPU) (Concept only).	2	
II	**Hardware**		**11**	**20**
	6	**Electronic Components** – Active Components - Diode, Transistor, Integrated Circuits (Definition, Symbol and Function).	1	
	7	**Electronic Components** - Passive Components – Resistors, Capacitors, Inductors (Definition, Symbol and Function).	1	
	8	**Motherboard Components –** CPU and Cooling Fan, RAM, Expansion Slots (PCIe), Input/Output Ports, Chipset (Concept only).	2	
	9	**Motherboard Components –** BIOS/UEFI Chip, SATA/NVMe Slots, Network Interface, Ports- Ethernet, VGA, HDMI, USB (Concept only).	3	
	10	**Computer Components** – SMPS, Motherboard, Storage Devises (HDD, SSD, NVMe (Concept only).	2	
	11	**Computer Components** – RAM (DRAM, SRAM, DDR SDRAM), ROM, Cache (Concept only).	2	
III	**Software**		**10**	
	12	**Software** - Application Software, System Software, Examples	2	
	13	**Operating System** – Need of OS, Types – Proprietary and Open Source, Hardware Software Compatibility, POST, Booting.	4	

	14	**OS Installation –** Bootable Media, UEFI/Legacy BIOS, Disk Partitioning, Dual Booting, Boot Manager – BOOTMGR, Grub, File Systems- FAT, NTFS, ext4.	4	**15**
	15	**Device Drivers –** Need of Device Drivers, Driver Interactions (Basic concept only).	2	
IV	**Computer Science and Computational Thinking**		**15**	**20**
	16	**Computer Science**- Role of Computer Science in the Modern Era.	1	
	17	**Problem Solving -** Defining the Problem, Systematic Approach.	2	
	18	**Computational Thinking** – Problem Decomposition, Pattern Identification, Abstraction, Generalization.	2	
	19	**Logical Thinking** – Inductive and Deductive Reasoning, Logical Expressions.	2	
	20	**Algorithmic Thinking** – Intuition vs Precision, Defining algorithms.	2	
	21	**Algorithm** – Need of Algorithm, Qualities of a Good Algorithm, Examples.	3	
	22	**Flowchart** - Flowchart Symbols, Examples. Raptor.	3	
V	**Practicals**		**30**	

		Strictly do the following activities from the Lab. 1. Identify, categorize and list out specifications of given **electronic components**. 2. Identify and list out specifications of given **motherboard components**. 3. Identify and Describe various **ports and connectors on motherboard**. **4.** Installation of various **components on motherboard** (Processor, Fan, Heat Sink, RAM etc.) 5. Hands-on experience in **assembling and disassembling** a computer system (SMPS, Motherboard, Storage Device etc.). 6. Accessing and configuring the **Basic Input/Output System (BIOS) or Unified Extensible Firmware Interface (UEFI)** settings. 7. Preparation of **Bootable media** with software like ***Rufus***. **8.** Check the hardware compatibility and **Install operating system** (single booting) on given computer. 9. Check the hardware compatibility and **Install operating systems** (dual booting – Windows and Linux) on given computer. **Develop algorithms and implement** the solutions using ***RAPTOR*** flowchart execution tool for the following problems. 10. Read and print a number. 11. Read the price of three items and print the total bill amount. 12. Read ages of two persons and print the elder one. 13. Read the number of units of electricity consumed and print the bill amount for various slabs. 14. Read a year and check whether it is a leap year. 15. Print first N numbers (using loop).		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO 5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	3	-	-	-	1						
CO 2	1	3	-	-	1	-						
CO 3	1	3	-	-	2	2						
CO 4	1	3	-	-	2	2						
CO 5	2	1	3	1	1	-						
CO 6	2	1	3	2	2	1						

Correlation Levels:

Level	**Correlation**
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓	✓	✓

CO 3	✓	✓	✓	✓
CO 4		✓	✓	✓
CO 5		✓		✓
CO 6	✓	✓	✓	✓

References:

1. Gary B. Shelly, Thomas J. Cashman, and Misty E. Vermaat. “Introduction to Computers”, Cengage Learning, 2008.
2. Pradeep K. Sinha and Priti Sinha, Computer Fundamentals: Concepts, Systems & Applications. BPB Publications.
3. Kevin Wilson, Computer Hardware: The Illustrated Guide to Understanding Computer Hardware. Amazon Digital Services LLC – KDP, 2018.
4. John Hanna, OS Installation 101: A Step-by-Step Approach for Newbies.
5. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC, 2014.
6. R.G. Dromey, How to solve it by Computer, PHI, 2008.

Programme	BSc Cyber Security Honours				
Course Title	Introduction to Cyber security and Digital Literacy				
Type of Course	Major				
Semester	2				
Academic Level	100 – 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3		2	75
Pre-requisites					
Course Summary	This course introduces students to the fundamentals of cybersecurity, covering key concepts, terminology, and practices essential for protecting information systems. It explores the principles of privacy, its legal protections, and the core concepts of encryption. Students will also examine the societal impacts of cybersecurity and critically evaluate the risks and benefits of social networks.By the end of the course, students will develop the knowledge and analytical skills needed to understand and address cybersecurity challenges effectively.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CLO1	Analyze fundamental cybersecurity concepts, theories, and strategies as they apply to real-world case studies.	An	C	Case Studies, Assignments
CLO2	Demonstrate an understanding of the principles of cryptography, focusing on encryption techniques.	U	C	Quizzes, Exams
CLO3	Design technical and non-technical security solutions for various types of cyber systems.	C	P	Projects, Practical Assessments
CLO4	Assess risks, vulnerabilities, and threats in sample cyber systems.	E	P	Case Studies, Risk Analysis Tasks
CLO5	Evaluate attributes associated with cybersecurity professionals and explain the functioning of institutions in the Indian criminal justice system.	E	C	Research Assignments, Group Discussions
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Module	Unit	Content	Hrs (75)	Marks
I	**Basics of Cyber Security**		**10**	20
	1	Introduction to Cyber Security, Importance and challenges in Cyber Security	2	
	2	Cyberspace - Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism	2	
	3	Cyber Security of Critical Infrastructure - -Organizational Implications.	2	
	4	Cyber security	2	
	5	Organizational Implications	2	
II	**Vulnerability in Cyber Space and Security**		**10**	
	6	Types of Hackers- Hackers and Crackers	1	
	7	Cyber-Attacks and Vulnerabilities- Malware threats- Sniffing - Gaining Access - Hiding Files - Covering Tracks- Worms - Trojans- Viruses- Backdoors.	2	

	8	Vulnerabilities- Overview, Vulnerabilities in Software, System administration, Threat Actors, Attacks, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications	3	15
	9	Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.	4	
III	**Ethical Hacking and Social Engineering**		**10**	
	10	Ethical Hacking Concepts and Scopes	1	
	11	Threats and Attack Vectors	1	
	12	Information Assurance- Threat Modeling	2	
	13	Enterprise Information Security Architecture	1	
	14	Vulnerability Assessment and Penetration Testing	2	
	15	Types of Social Engineering- Insider Attack	1	
	16	Preventing Insider Threats- Social Engineering Targets and Defence Strategies	2	
IV	**Cyber Forensics and Auditing**		**15**	
	17	Introduction to Cyber Forensics- Computer Equipment and associated storage media	1	
		Role of forensics Investigator		
	19	Forensics Investigation Process - Collecting Network based Evidence- Writing Computer Forensics Reports	3	20
	20	Auditing - Plan an audit against a set of audit criteria	2	
	21	Information Security Management System Management. Introduction to ISO 27001:2013	3	
V	**Practical - Architecture of Cyberspace**		**10**	
	22	Defining Cyberspace and Overview of Computer and Web-technology	2	
	23	Architecture of cyberspace	1	
	24	Complex Network Architectures	2	
	25	Internet, Worldwide web,Advent of internet	1	
	26	Internet infrastructure for data transfer and governance	1	
	27	Internet society, Regulation of cyberspace	1	
	28	Concept of cyber security ,Issues and challenges of cyber security.	2	

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO 5	PO1	PO2	PO3	PO4	PO5	PO6	PO7

CO 1	3	1	3	1	2	2	2	2	2	2	2	3
CO 2	3	1	3	2	2	2	3	3	1	1	1	3
CO 3	3	3	2	1	1	3	3	3	3	2	2	2
CO 4	3	1	1	3	2	3	3	2	3	1	1	3
CO 5	1	2	1	3	2	3	1	3	1	2	1	3

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3		✓	✓	✓
CO 4		✓	✓	✓
CO 5	✓	✓		✓

References:

1. Donaldson, S., Siegel, S., Williams, C.K., and Aslam, A. (2015). ―Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats‖, Apress, 1st Edition.
2. Franke, Don Cyber Security Basics: Protect your organization … (Paperback)
3. Nina Godbole, Sumit Belapure, (2011). ―Cyber Security‖, Willey.
4. Roger Grimes, ―Hacking the Hacker‖, Wiley, 1st Edition, 2017.
5. Yuri Diogenes and Erdal Ozkaya (2018). Cyber security– Attack and Defense Strategies: 2nd Edition Paperback.

Programme	BSc Cyber Security Honours				
Course Title	Mathematical Foundation				
Type of Course	Major				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	4	-	-	60
Pre-requisites	Basic Mathematics is required (Algebra, Arithmetic)				
Course Summary	This course provides a fundamental exploration of mathematical concepts essential for Cyber Security. Students will explore key topics including Linear Algebra, Differential and Integral Calculus. The course aims to equip students with the mathematical tools and reasoning skills necessary for creating and analyzing algorithms, understanding and solving computational problems in various areas of Cyber Security.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Reflect the concept of matrices and determinants as a way to depict and streamline mathematical ideas to perform basic operations.	U	C	Instructor- created exams / Quiz/Assignment Seminar
CO2	Able to find the inverse of square matrices using different methods and demonstrate a solid understanding of eigen values.	U	C	Instructor-created exams/ Quiz/Assignment / Seminar
CO3	Proficiency in solving linear equations using different techniques and understanding the geometric interpretation of solutions.	U	C	Instructor-created exams/ Quiz/Assignment / Seminar
CO4	Gain proficiency in representing vectors geometrically and algebraically, understanding vector addition, dot and cross products.	U	C	Instructor-created exams/ Quiz/Assignment / Seminar

CO5	Able to apply differential and integral calculus to various functions encountered in computer applications such as polynomials, exponentials and logarithmic functions.	U	C	Instructor-created exams/ Quiz/Assignment / Seminar
CO6	Represent various mathematical problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.	U, Ap	C, P	Practical Assignment / Observation of Practical Skills

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus

Module	Unit	Contents	Hrs (48+12)	Marks
I		**Matrices and Determinants**	**14**	**18**
	1	Matrices: Definition, Order of a matrix, Types of matrices	2	
	2	Operations on matrices: Addition, Subtraction, Multiplication	3	
	3	Properties of matrix: Various kind of Matrices, Transpose of a matrix	2	
	4	Elementary Transformations of Matrices and Rank of Matrices	2	
	5	Symmetric and Skew Symmetric Matrices	2	
	6	Determinants, Minors, Cofactors, Inverse of a matrix	3	
II		**Linear Algebra and Vector Calculus**	**12**	**18**
	7	Linear Independence: Characteristic equations,	1	
	8	Eigen values, Eigen Vector	2	
	9	Solving system of linear equations: Gauss Elimination Method, Gauss Jordan method, Gauss Siedel Methods	3	
	10	Vectors: Definition Magnitude of a vector, Types of Vectors, Vector addition	2	
	11	Dot products and Cross products	2	

	12	Vectors in 2- and 3-space	2	
III	**Differentiation**		**11**	**17**
	13	Limits; Definition (concept only), Derivative of a Point, Derivative at Function	2	
	14	Differentiation: Definition, Differentiation from first principle, Differentiation of important function	2	
	15	Product rule, Quotient rule	3	
	16	Derivative of function of a function	2	
	17	Logarithmic differentiation	2	
IV	**Integration**		**11**	**17**
	18	Integration: Integral as Anti-derivative, Indefinite integral & constant of integration	2	
	19	Fundamental theorems, Elementary Standard results	2	
	20	Integral of different functions, Integration by Substitution	3	
	21	Definite Integrals, Properties of definite integrals	2	
	22	Evaluation of Definite Integrals by Substitution	2	
V	**Open Ended Module – Application Level**		**12**	
	1	Discuss topics from the following: ● Differential Equation. ● Concept of First Order ODE's. ● Concept of Second Order ODE's. ● Application of Logarithm. ● Combinatorics. ● Trigonometric concept. ● Applications of Matrices in various field of computer like image processing, cryptography etc. ● Real-world examples for using eigen values and eigen vectors. ● Vectors assist in GPS technology to provide accurate navigation data. ● 3D vectors enhancement in virtual reality experiences. ● Discuss the importance of differentiation and integration in various computer fields, such as Machine Learning, Robotics, Quantum Computing, etc.	10	
	2	Case Study	2	

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	1	1	-	-						
CO 2	2	-	2	2	-	-						
CO 3	2	-	2	2	-	-						
CO 4	2	-	2	2	-	-						
CO 5	2	-	2	2	-	-						
CO 6	2	-	2	2	-	-						

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓

CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5	✓	✓		✓
CO 6	✓	✓	✓	✓

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley
2. Higher Engineering Mathematics, John Bird, Elsevier Direct
3. Skills in Mathematics: Algebra, S.K.Goyal
4. Higher Engineering Mathematics, B S Grewal, Khanna Publishers
5. Higher Engineering Mathematics, Ramana, Tata McGraw Hill
6. Engineering Mathematics, P Kandasamy, S. Chand Group

Programme	BSc Cyber Security Honours				
Course Title	Data Structures and Algorithm				
Type of Course	Major/Minor				
Semester	III				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	1. Fundamental Mathematics Concepts: Set, Functions, Logic				
Course Summary	This course explores implementations of linked list and array-based data structures, delving into the inner workings of basic data structures including lists, stacks, queues, trees, and graphs.				

Course Outcomes (CO)

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Differentiate basic data structures (arrays, linked lists, stacks, queues) based on their characteristics, operations, and real-world applications.	U	C	Instructor-created exams / Quiz

CO2	Perform basic operations (e.g., insertion, deletion, search) on fundamental data structures using a chosen programming language.	Ap	P	Practical Assignment / Observation of Practical Skills
CO3	Identify the properties and applications of advanced data structures (trees, graphs).	Ap	P	Seminar Presentation / Group Tutorial Work
CO4	Investigate the properties of various searching and sorting Techniques	U	C	Practical Assignment / Seminar
CO5	Demonstrate critical thinking and problem-solving skills by applying data structures and algorithms to address complex computational challenges.	Ap	P	Viva Voce/ Observation of Practical Skills
CO6	Implement and analyse different data structure algorithms (to solve practical problems.	Ap	P	Case study/ Project
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus

Module	Unit	Content	Hrs (45+30)	Marks
I	**Introduction to Data Structures and Basic Algorithms**		**9**	**15**
	1	Introduction to Data Structures: Definition, Classification of data structures -Linear and Non- Linear, Static and Dynamic, Data Structure Operations, Applications of Data Structures	1	
	2	Introduction to Arrays: Definition, Types (1 Dimensional, 2 Dimensional, Multi-Dimensional, Sparse matrix), Different Array Operations with Algorithm (insertion, deletion, traversal)	3	
	3	Structures and Self-referential structures	1	
	4	Introduction to Linked list: Definition, Types (Single linked list, Doublelinked list, Circular linked list- concept only).	2	
	5	Singly Linked List Operations with Algorithm (insertion, deletion, traversal)	2	
II	**Stack and Queue**		**10**	**20**
	6	Introduction to Stack: Definition, stack operations with Algorithm, Applications: recursion, infix to postfix - example and Algorithm	3	
	7	Implementation of Stack: using array (overflow & underflow) and Linkedlist (with algorithm)	2	
	8	Introduction to Queue: Definition, queue operations with Algorithm, Types: Double ended queue (Input Restricted and Output restricted), Circularqueue, Applications	2	
	9	Implementation of Queue: using array and Linked list (with algorithm)	3	
III	**Non- Linear Data Structures**		**16**	**20**
	10	Introduction to Trees: Basic terminology, Types (Binary tree- complete,full, skewed etc., Expression Tree)	2	
	11	Properties of Binary tree, Applications.	2	
	12	Binary tree representations- using array and linked list	2	
	13	Operations on Binary tree- Insertion, Deletion, Traversal- inorder, preorder, postorder - (concepts with examples)	3	
	14	Algorithm of non-recursive Binary tree traversal	3	
	15	Introduction to Graph: Definition, Basic terminology, Types (Directed, Undirected, Weighted).	2	
	16	Graph representation –Adjacency list and Adjacency Matrix, Applications.	2	
IV	**Sorting and Searching**		**10**	**15**
	17	Introduction to Sorting: Definition, Classification (Internal, External)	1	
	18	Internal Sorting Algorithms: Selection sort- Selection sort algorithm, Exchange sort- Bubble sort algorithm	2	

	19	External Sorting Algorithms: Merge sort- Demonstrate with example (NoAlgorithm needed)	1	
	20	Advanced sorting Algorithm-: Quick sort- Demonstrate with example. (NoAlgorithm needed)	1	
	21	Introduction to Searching: Linear search and Binary search (Algorithm needed) with example.	2	
	22	Hashing: Hash Tables, Hash Functions, Different Hash Functions – Division method, Multiplication method, Mid square method, Folding Method	2	
V	**Practical - Hands-on Programming in Data Structures: Practical Applications, Case Study and Course Project**		**30**	
	1	**Implement the following using C Language** **1.** Basic Operations in a single linked list (Menu driven) **2.** Stack using array. **3.** Queue using Array **4.** Sorting algorithms- Selection, Bubble Sort **5.** Searching Algorithms- Linear and Binary search	25	
	2	Project/ Case study	5	

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	1	1	-	-	-						
CO 2	2	1	2	3	-	-						
CO 3	2	1	2	3	-	-						
CO 4	2	-	2	3	-	-						
CO 5	1	1	2	3	1	-						
CO 6	1	1	3	3	1	-						

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

Assignment/ Quiz/ Discussion / Seminar

- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. Seymour Lipschutz, “Data Structures with C”, McGraw Hill Education (Schaum'sOutline Series).
2. Reema Thareja, “Data Structures Using C”, Oxford University Press.

Programme	BSc Cyber Security Honours				
Course Title	Object Oriented Programming in Java				
Type of Course	**Major**				
Semester	IV				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	1. Knowledge in basic programming 2. Knowledge in OOP Concepts				
Course Summary	The aim of this course is to provide students with an understanding of the basic concepts in Java programming. This course will help students create GUI applications in Java and establish database connectivity.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	To understand the concepts and features of Object-Oriented Programming (OOPs)	U	C	Practical Assignment / Instructor-created exams / Quiz
CO2	To practice programming in Java	Ap	P	Practical Assignment / Instructor-created exams / Quiz
CO3	To learn java's exception handling mechanism, I/O operations and multithreading.	Ap	P	Practical Assignment / Instructor-created exams / Quiz
CO4	To learn java's O operations and multithreading.	Ap	P	Practical Assignment / Instructor-created exams / Quiz
CO5	Implement programs using Java Database Connectivity	Ap	P	Practical Assignment / Instructor-created exams / Quiz

CO6	Students will be capable of developing Graphical User Interface (GUI) applications using Swing, understanding layout management, and implementing basic event handling.	Ap	P	Practical Assignment / Instructor-created exams / Quiz

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus

Module	Unit	Content	Hrs (45+30)	Marks
I	**Review of OOPs and Introduction to Java**		**17**	**20**
	1	Overview of OOPs Concept	1	
	2	History of Java and Java Virtual Machine	1	
	3	Basic Structure of Java Programming: Data Types, Operators, Expression and Control Statement	2	
	5	Arrays and String: One Dimensional Array, Multidimensional Array, String Operations	2	
	6	Scanner, Type Conversion and Casting	2	
	7	Introduction to Class and Objects: Definition of Class and Objects, Access Modifier	2	
	8	Constructor and Inheritance: Types of Constructors, Types of Inheritance, use of extends, super, final, this keyword	3	
	9	Method Overriding, Method Overloading and Dynamic Method Dispatch: Programming implementation of Method Overriding and Overloading	2	
	10	Interface, Abstract Class and Packages; Programming implementation of Interface, Abstract class and Packages	2	
II	**Exception and I/O Operations**		**8**	**15**
	11	Exception: Baic Concept of exception and Exception Hierarchy	2	
	12	Managing Exception: Use of try….catch ….. finally blocks, throw and throws keyword	2	
	13	Managing Input/Output files in Java: Importance of I/O Operations, BufferedInputStream, BufferedOutputStream	2	

	14	File Operations: Programming implementation of FileInputStream, FileOutputStream, FileReader, FileWriter	2	
III	**Multithreading and Database Connectivity**		**9**	**20**
	15	Thread: Concept of Thread and Thread state	2	
	16	Programming Implementation of Thread: Using extending thread class and Runnable interface, Thread Priorities	2	
	17	Database Programming: Basic Concept of Database and JDBC Driver, Connecting with Database	2	
	18	Querying Database: Programming implementation of creating table, insert and update values to the table using preparedStatement, Statement object and querying the values using ResultSet and ResultSetMetadata	3	
IV	**GUI Programming**		**11**	**15**
	19	Introduction to GUI Application: AWT Basics, Introduction to IDE	2	
	20	Swing Programming: Introduction of Model-View-Controller Pattern	2	
	21	Introduction to layout Management: Fundamental controls used in SWING	4	
	22	Event Handling: Basic Knowledge of Event Handling (Event Class and Event Listener)	3	
V	**Practical - Hands-on Programming in Java(Using IDE NetBeans, Eclipse, VSCode):**		**30**	**30**
	Practical Applications, Case Study and Course Project			
	1	Implement the following:		
		1. String and Arrays:		
		Write a program to perform various String operations in Java (Hint: charAt, substring, concat, equals,, isEmpty..)		
		Write a program to implement Multi-Dimensional Array (Hint : Matrix multiplication)		
		2. Object Oriented Programming Concept:		
		Write a program to implement the concept of class and object (Hint: Complex Number addition)		
		Write a program to demonstrate the order in which constructors are invoked in multilevel inheritance.		
		Write a program to implement method overloading		
		Write a program to implement method overriding.		

		3. Exception Handling and Multithreading:		
		Write a program to implement try…cacth, finally block (Hint: Arithmetic and ArrayOutOfBound Exception)		
		Write a multi thread java program for displaying odd numbers and even numbers up to a limit (Hint: Create thread by inheriting Thread class).		
		Write a multi thread java program for displaying odd numbers and even numbers up to a limit (Hint: Implement thread using Runnable interface).		
		4. GUI Application with Database:		
		Write a swing program to track mouse & key events		
		Write a swing program to fetch data from TextFiled and display it in Label		
		Write a swing program to perform form validation		
		Write a swing program to display data in tabular form		
		Write a simple login program without database connectivity		
		Write a swing program to create a registration form (Hint: Create table student in any database and link the registration form with database using JDBC)		
	2	Case Study	2	
	3	**Project:** Build a application for shop management system (Eg: Admin Login, Product registration, stock management, product selling, employee salary)	8	

Mapping of COs with PSOs and POs :

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	-	3	3	-	-						
CO 2	1	-	3	3	-	-						
CO 3	-	-	3	3	2	3						
CO 4	-	-	2	3	-	-						
CO 5	-	-	3	3	2	3						
CO 6			3	3	3							

Correlation Levels:

Level	Correlation

-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓	✓		✓
CO 4		✓		✓
CO 5		✓		✓

References:

1. Herbert Scheldt, Java: The Complete Reference, 12th Edition, Tata McGraw-Hill Edition, ISBN: 9781260463415.

2. C. Thomas Wu, An introduction to Object-oriented programming with Java, 5e, McGraw-Hill, 2009.
3. Y. Daniel Liang, Introduction to Java programming, Comprehensive Version, 10e, Prentice Hall India, 2013.
4. K. Arnold, J. Gosling, David Holmes, The JAVA programming language, 4e, Addision- Wesley, 2005.

Programme	BSc Cyber Security Honours				
Course Title	Database Management System				
Type of Course	Major				
Semester	IV				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Discrete Mathematics, Data structures and Programming Basics				
Course Summary	This course introduces database management systems. The topics covered include the concept of Database Management System, ER Model, Relational model, SQL, Database design, Transactions, concepts of other data model-NoSQL and practical session to implement Database Concepts.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	A comprehensive understanding of fundamental concepts in database management systems and its application	U	C	Instructor-created exams / Quiz
CO2	Understand concepts of Relational Data Model and Normalization Techniques	U	C	Instructor-created exams / Quiz
CO3	Apply principles of entity-relationship modeling and normalization techniques to design efficient and well-structured databases that meet specified requirements.	Ap	P	Practical Assignment / Observation of Practical Skills
CO4	Acquire expertise in crafting and executing SQL queries for the retrieval, updating, and manipulation of data, showcasing adept skills in database querying and data manipulation	Ap	p	Practical Assignment / Observation of Practical Skills
CO5	Comprehend and apply strategies for managing transactions and implementing mechanisms for controlling concurrency, ensuring the database's consistency and reliability in environments with multiple users.	Ap	P	Practical Assignment / Observation of Practical Skills
CO6	Explore and analyze recent trends in database management systems, with a focus on unstructured databases, NoSQL technologies	An	P	Practical Assignment / Observation of Practical Skills

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus

Module	Unit	Content	Hrs (45+30)	Mark
I	**Database System- Concept**		**10**	**15**
	1	Introduction, Characteristics of the Database Approach	2	
	2	Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach, File system vs Database	2	
	3	Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence	3	
	4	Database Languages and Interfaces	2	
	5	Structured, Semi Structured and Unstructured Database	1	
II	**Database Design**		**14**	**20**
	6	ER Model- Basic concepts, entity set & attributes, notations	2	
	7	Relationships and constraints, cardinality, participation, notations, weak entities	2	
	8	Relational Model Concepts-Domains, Attributes, Tuples, and Relations, Values and NULLs in the Tuple	2	
	9	Relational Model Constraints and Relational Database Schemas	2	
	10	Relational Database Design- Atomic Domain and Normalization	2	
	11	INF, 2NF,3NF, BCNF	4	
III	**Query Languages**		**11**	**20**
	12	SQL-, introduction to Structured Query Language (SQL)	1	
	13	Data Definition Language (DDL), Table definitions and operations	2	
	14	SQL DML (Data Manipulation Language) - SQL queries on single and multiple tables	4	
	15	Nested queries (correlated and non-correlated), Aggregation and grouping, Views, assertions, Triggers, SQL data types.		
	16	Introduction to NoSQL Databases	2	
	17	Main characteristics of Key-value DB (examples from: Redis), Document DB (examples from: MongoDB)	2	
IV	**Transaction Processing, Concurrency Control**		**10**	**15**
	18	Transaction Processing: Introduction, Transaction and System Concepts	3	
	19	Desirable Properties of Transactions	1	
	20	Characterizing Schedules Based on Recoverability & Serializability	2	
	21	Transaction Support in SQL.	1	

	22	Introduction to Concurrency Control: Two-Phase Locking Techniques	3	
V	**Practical - DBMS LAB**		**30**	
	1	Students should decide on a case study and formulate the problem statement.	3	
	2	Based on Identified problem Statement, Design ER Diagram (Identifying entities, attributes, keys and relationships between	3	
		entities, cardinalities, generalization, specialization etc.) Note: Student is required to submit a document by drawing ER Diagram to the Lab teacher.		
	3	Converting ER Model to Relational Model (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys) Note: Student is required to submit a document showing the database tables created from ER Model.	2	
	4	Normalization -To remove the redundancies and anomalies in the above relational tables, Normalize up to Third Normal Form	3	
	5	Creation of Tables using SQL- Overview of using SQL tool, Data types in SQL, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables	3	
	6	Practicing DML commands-Insert, Select, Update, Delete	2	
	7	Experiment 7: Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, CONSTRAINTS etc.	2	
	8	Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).	2	
	9	Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.	4	
	10	Install and Configure MongoDB to execute NoSQL Commands.	6	

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	2	-	-	-	-						
CO 2	2	2	1	-	-	-						
CO 3	-	-	2	3	-	-						
CO 4	-	-	-	3	3	-						
CO 5	-	-	-	3	3	-						

CO 6	2	-	-	-	2	3						

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3		✓	✓	✓
CO 4		✓	✓	✓
CO 5	✓	✓		✓
CO 6		✓	✓	✓

References:

1. Database System Concepts (Sixth Edition) Avi Silberschatz, Henry F. Korth, S. Sudarshan McGraw-Hill 2011 ISBN 978-0071325226/ 0-07-352332-1.
2. Database Management Systems, Third Edition Raghu Ramakrishnan and Johannes Gehrke McGraw-Hill ©2003.

Programme	BSc Cyber Security Honours

Programme	BSc Cyber Security Honurs				
Course Title	**Computer Networks**				
Type of Course	Major				
Semester	IV				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	1. Knowledge in Computer Organization. 2. General knowledge in Operating System.				
Course Summary	This course covers the concepts of data communication and computer networks. It comprises of the study of the standard models for the layered protocol architecture to communicate between autonomous computers in a network and also the main features and issues of communication protocols for different layers. Topics covered comprise of introduction to OSI and TCP/IP models also.				

Sl. NO:	Course Outcome	Cognitive level *	Knowledge category #	Evaluation Tools used
CO1	To understand the fundamentals of computer networks including concepts like data communication ,network topologies and the reference models	u	C	Instructor-Create Exams or Quiz
CO2	Proficiency in Transmission Media and Multiplexing Techniques:	A	P	Discussions and Quizzes
CO3	To familiarise with the common networking protocols and standards	u	F	Instructor created exams or Home assignments
CO4	Describe ,analyse and compare different data link, network and transport layer protocols	A, E	P	Discussions, Quizzes
CO5	Design/implement data link and network layer protocols in simulated networking environment	Ap	P	Viva Voce Observation of practical skills

CO6	To understand the need of various Application layer protocols	u	M	Instructor Created -Exams, Assignments

* - Remember (R), understand (u), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge

(M)

Module	Unit	Content	Hrs	Marks
I	**Introduction to Computer networks and Network models**		**12**	**17**
	1	*Types of computer networks, lnternet, lntranet, Network topologies, Network classifications.*	2	
	2	*Network Architecture Models: Layered architecture approach, OSl Reference Model, TCP/lP*	2	
	3	*Physical Layer: Analog signal, digital signal, Analog to Digital, Digital to Analog, maximum data rate of a channel transmission*	4	
	4	*Transmission media (guided - unguided transmission media)*	2	
	5	*multiplexing (frequency division multiplexing, time division multiplexing, wavelength division multiplexing)*	2	
II	**Data Link Layer**		**11**	**18**
	6	*Data link layer services, error-detection* Types of errors, Single bit error and Burst error, Vertical redundancy check (VRC), longitudinal redundancy Check (LRC), Cyclic Redundancy Check (CRC),Check sum Error correction - Single bit error correction, Hamming code	2	
	7	*Error correction techniques,* *error recovery protocols (stop and wait, go back n, selective repeat),*	3	
	8	*multiple access protocols, (TDMA/FDP, CDMA/FDD/CSMA/CD, CSMA/CA),*	2	
	9	*Datalink and MAC addressing, Ethernet, Polling*	1	
	10	IEEE Standards- Wireless LANS,Ethernet,Bluetooth	3	
III	**Network layer**		**11**	**18**
	11	*Networking and lnternetworking devices - Repeaters, Bridges, Routers, Gateways, Firewall*	2	
	12	*Logical addressing - lPv4 & lPv6 addresses, Network Address Translation (NAT), lnternet protocols, internetworking, Datagram,*	2	

	13	*Transition from lPv4 to lPv6*	1	
	14	*Address Mapping-Error reporting and multicasting - Delivery,*	2	
	15	*Forwarding and Routing algorithms, Distance Vector Routing,*	2	
	16	*Link State Routing. Dijkstra*	2	
IV	**Transport Layer and Application layer**		**11**	**17**
	17	*Transport layer, Process-to-process Delivery: UDP, TCP*	2	
	18	*Congestion control and Quality of Service,*	2	
	19	*Domain Name Systems-Remote Login, Email*	2	
	20	*FTP, WWW, HTTP*	2	
	21	*lntroductory concepts on Network management & Mail transfer: SNMP,*	2	
	22	*SMTP*	1	
V	**Practicals - Hands-on Computer Networks:** **Practical Applications,**		**30**	
	1	Lab 1: identifying Networking Hardware components(Jacks, Cables, Tools) Lab 2 IP address - configuring. Lab3. crimping Lab 4: Configuring network host - setting hostname - assigning IP address Lab 5: configuring the Network Interface card – Lab 6: Setup a Wired LAN with more than two systems Lab 7:Setup a Wireless LAN with more than two systems Lab 8: Setting up Internet services File Transfer Protocol(FTP), Lab 9: Simple Mail Transfer Protocol(SMTP) and Post Office Protocol(POP) Lab 10: Setting up Intranet Services - Network File System(NFS),	20	
	2	Case study	3	
	3	**Capstone (/Course) Project:** Build a practical application using Wired Network	7	

References:

1. *Behurouz A Forozan, lntroduction to Data Communications & Networking, TMH*
2. *Andrew S. Tanenbaum, Computer Networks, PHl*
3. *William Stallings, Data and Computer Communications, Vllth Edition, Pearson Education*

General Foundation Courses

Programme	BSc Cyber Security Honours				
Course Title	Data Analysis and Visualisation through Spreadsheet				
Type of Course	**MDC**				
Semester	I				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	• Basic understanding of computers • Familiarity with basic mathematical operations				
Course Summary	This course provides a comprehensive introduction to Spreadsheets, focusing on understanding formulas, functions, data organization, analysis techniques, and data visualization. Participants will gain skills in spreadsheet management, data cleansing, analysis, and visualization using Excel's various tools and features.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will demonstrate proficiency in managing spreadsheets, including creating, formatting, and manipulating data within Excel workbooks. They will be able to effectively navigate Excel's interface and utilize toolbars.	U	P	Instructor-created exams / Quiz
CO2	Learners will understand the importance of data organization and cleansing in Excel. They will be able to import, export, filter, sort, validate, and remove duplicates from datasets. Students will develop skills to ensure data integrity and consistency, enhancing their ability to work with clean and organized data sets.	U	P	Instructor-created exams/ Home Assignments
CO3	Participants will acquire advanced data analysis skills like pivot tables, what-if analysis, and goal seek. They will be able to apply various Excel functions and tools to perform complex calculations, analyze trends, and make informed decisions based on data analysis.	Ap	P	Instructor-created exams
CO4	Students will gain proficiency in data visualization techniques using Excel.	Ap	P	Instructor-created exams

	They will be able to create a variety of charts, design pivot charts, dashboards for effective data analysis. Additionally, learners will be able to implement form controls for interactive data manipulation in their visualizations.			
CO5	Learners will develop skills in advanced features of Excel like macros, protect data sheets and workbooks, utilize split, freeze, and hide options effectively, incorporate add-ins for extended functionalities, and manage printing options in Excel for professional presentation of data.	Ap	P	Instructor-created exams
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Module	Unit	Content	Hrs (36+9)	Marks (50)
I	**Introduction to Excel & Understanding Formulas, Functions**		**9**	**15**
	1	Features of Spreadsheet	1	
	2	Parts of Excel Window, Tool bars, Work sheet and Work book, Insertion and Deletion of cells, columns, rows	2	
	3	Formatting in Excel (Merge, Warp, Font Formatting, Number Formatting, Borders and Shading, Colouring)	2	
	4	Range, Autofill, Autosum, Relative, Absolute and Mixed Referencing in Excel, Linking data between worksheets	2	
	5	Formulas and Functions in Excel: Use of Formula Bar, Functions: SUM,ROUND, CEIL, FLOOR,IF, AND, OR,AVERAGE, MIN, MAX ,COUNT, COUNTIF, SUMIF, VLOOKUP,HLOOKUP	2	
II	**Cleansing and Organising Data in Excel**		**9**	**10**
	6	Importance of Data Cleansing and Organisation	1	
	7	Data Import and Export	2	
	8	Filtering and Sorting	2	
	9	Data Validation and remove Duplicates	1	
	10	Group, Ungroup, Subtotal	2	
	11	Conditional Formatting - Highlight Cell Rules, Top/Bottom Rules	1	
III	**Advanced Techniques for Data Analysis**		**8**	**10**

	12	Features of Pivot table	1	
	13	Pivot Table creation	2	
	14	What-if Analysis	2	
	15	Goal Seek	2	
	16	Watch Window	1	
IV	**Data Visualisation Techniques**		**10**	**15**
	17	Creating Charts, Different types of charts	2	
	18	Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table	2	
	19	Pivot Chart	2	
	20	Dashboards	1	
	21	Form Controls	3	
V	**Open Ended Module: More about Excel**		**9**	
	1. Recording and Running Macros 2. Protecting Data Sheets and Workbooks 3. Split, Freeze and Hide options 4. Add-ins 5. Printing options in Excel			

References

1. "Excel 2019 Bible" by Michael Alexander and Richard Kusleika
2. "Excel Formulas & Functions For Dummies" by Ken Bluttman and Peter Aitken
3. "Excel with Microsoft Excel: Comprehensive & Easy Guide to Learn Advanced MS Excel" by Naveen Mishra

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Final Exam

Programme	BSc Cyber Security Honours				
Course Title	Digital Empowerment through Ethical Standards				
Type of Course	**MDC**				
Semester	II				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	Basic understanding of computers				
Course Summary	This course explores the evolution from pre-digital challenges to the current digital landscape, covering historical milestones, key technologies, and the vision of Digital India. It emphasizes the benefits and importance of digital revolution while addressing ethical and security considerations. Participants engage with digital tools for personal and professional growth and examine case studies on digital infrastructure, missions, and services to understand real-world applications.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will be able to analyze the challenges of the pre-digital age and comprehend the importance and benefits of digital revolution, facilitating a deeper understanding of technological evolution.	An	F	Instructor-created exams / Quiz
CO2	Participants will gain familiarity with key digital technologies like Cloud Computing, IoT, AI, and Blockchain, equipping them with the knowledge to identify their applications and potential benefits in different sectors.	U	C	Instructor-created exams/ Home Assignments
CO3	Students will develop insights into Digital India initiatives and emergence of Kerala as Digital Society	U	C	Instructor-created exams
CO4	Through exploration of digital tools for personal and professional growth, students will enhance their digital literacy and ability in utilizing tools for data sharing, online learning, networking, and content creation,	Ap	P	Instructor-created exams

	empowering them to thrive in the digital age.			
CO5	Learners will become aware of ethical and security considerations in the digital age, including privacy concerns, Intellectual Property Rights, key terminologies related to cyber security, and an introduction to cyber laws in India, fostering responsible digital citizenship.	U	C	Instructor-created exams
CO6	Students will analyze real-world case studies of digital infrastructure projects, digital missions, and digital services to demonstrate a comprehensive understanding of the practical applications and implications of digital technologies in various contexts, fostering critical thinking and strategic decision-making skills in digital transformation initiatives.	An	C	Instructor-created exams
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Module	Unit	Content	Hrs 36+9	Marks (50)
I	**Transition to Digital World**		**7**	**8**
	1	Challenges of Pre-Digital Age	1	
	2	Importance and Benefits of Digital Revolution	2	
	3	Key concepts: digitization, digitalization, digital transformation	1	
	4	Introduction to Key Digital Technologies: Cloud Computing, IoT, AI, Block Chain	3	
II	**Perspective of Digital India & Digital Innovations in Kerala**		**11**	**15**
	5	Understanding Digital India: Concept, Objectives, and Evolution	1	
	6	Overview of Digital Infrastructure: Broadband Connectivity, Digital Literacy, and Access to Information	2	
	7	Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, , e-Health Campaigns	3	
	8	Kerala-Emergence as Digital Society : Internet & Mobile Penetration in Kerala, 4 Pillars of Digital Emergence in Kerala (Akshaya Project, IT@School Project, Digital	2	

		Infrastructure Availability, State Data Centre & allied Applications),		

	9	Role of K-DISC in Digital Empowerment	1	
	10	Kerala State IT Mission: Core IT Infrastructure, e-Governance Applications, Service Delivery Platforms,	2	
III	**Digital Tools for Personal and Professional Growth**		**9**	**12**
	11	Digital Tools for Data Sharing: Google Drive, Google Sheets	2	
	12	Digital Tools for Data Sharing: Google Docs, Google Classroom	3	
	13	Online learning platforms and resources (e.g., Coursera, Khan Academy, MOOCs, Duolingo)	2	
	14	Networking Tools: LinkedIn	1	
	15	Content Creation and Management: Canva	1	
IV	**Ethical and Security Considerations in the Digital Age**		**9**	**15**
	16	Understanding privacy in the digital age	1	
	17	Legal and ethical considerations in data collection and processing: Intellectual Property Rights (IPR)	2	
	18	Key Terminologies: Cyber Security, Cyber Crime, Cyber Attack, Cyber Espionage, Cyber Warfare	2	
	19	Authentication, Authorisation	1	
	20	Cyber Crimes and Classification	2	
	21	Introduction to Cyber Laws in India	1	
V	**Open Ended Module: Case Study (One from each set)**		**9**	
	1	Case Study on Digital Infrastructure Projects: (Bharat Broadband Network (BBNL) , Submarine Cable Project, Google Data Center)	3	
	2	Case Study on Digital Mission: (Digital Literacy Missions in Kerala, SmartDubai Project, China's Digital Silk Road)	3	
	3	Case Study on Digital Services: (MyGov.in , Moodle LMS, Digital Payment Services)	3	

References

1. "Digital India Importance Needs and Values" by S K Kaushal
2. "Cyber Security in India: Government, Law Enforcement and Corporate Sector" by Vipin M. Chaturvedi and Shivani Kapoor
3. "Information Security: Principles and Practices in Indian Context" by R.S. Pressman, G. Sharma, and G. Sridhar
4. "Introduction to Computer Security" by Michael Goodrich and Roberto Tamassia
5. https://kdisc.kerala.gov.in/
6. https://itmission.kerala.gov.in/

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Final Exam

Programme	BSc Cyber Security Honours				
Course Title	Introduction to Cyber Laws				
Type of Course	VAC				
Semester	III				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	1. Basic Computer Literacy 2. Familiarity with Online Platforms				
Course Summary	Introduction to Cyber laws provides students with a foundational understanding of various concepts Cyber Crimes and Cyber laws against them.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	To understand the concept of Cyber Space, Cyber Crimes and cyber laws	U	C	Instructor-Create Exams or Quiz
CO2	To understand details of cybercrimes and criminals	A	P	Discussions and Quizzes
CO3	To examine various provisions in IT Act 2000	U	F	Instructor created exams or home assignments
CO4	To Identify Intellectual Property right and E-commerce related issues.	A, E	P	Discussions, Quizzes
CO5	To get overall idea of cyber laws and its enforcement mechanisms in India	Ap	P	Viva Voce Observation of practical skills
CO6	To get to know about Penalties and legal implications associated with cybercrimes under Indian law	U	M	Instructor Created - Exams, Assignments
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus

Module	Unit	Content	Hrs (36+9)	Marks 50
I		**Introduction to Cyber Space**	**9**	**12**
	1	Cyber Space- Fundamental definitions	2	
	2	Jurisprudence and-Jurisdiction in Cyber Space	2	

	3	Need for IT act - Enforcement agencies	3	
	4	Introduction to cyber law and its relevance in the Indian context	2	
II	**Cyber Crimes and Criminals**		**9**	**12**
	5	Cyber crimes	2	
	6	Cyber Criminals and their Objectives	2	
	7	Cyber stalking; cyber pornography	2	
	8	Forgery and fraud; crime related to IPRs;	2	
	9	Phishing and Identity Theft	1	
III	**Indian Cyber law**		**9**	**14**
	10	Introduction to Indian Cyber Law	2	
	11	Cyber Crime vs Conventional Crime	2	
	12	Electronic Commerce and related issues	2	
	13	Overview of Intellectual Property rights	2	
	14	Computer Software and related IPR Issues	1	
IV	**Basics of IT law and its regulatory mechanisms**		**9**	**12**
	13	Key provisions of the Information Technology Act, 2000 related to cybercrimes and offenses	2	
	14	Regulatory Mechanisms and Enforcement	2	
	15	Overview of the Cyber Crime Investigation Cell (CCIC)	2	
	16	Understanding the process of reporting cyber crimes	2	
	17	Penalties and legal implications associated with cybercrimes under Indian law (basics only)	1	
V	**Open ended module** **Hamds on: Practical Applications, Case Study and Course Project**		**9**	
	1	Social media based Cyber crimes	2	

	2	Discussion on Emerging issues	2	
	3	Recent trends in digital marketing	3	
	4	Demonstrate how to use google web masters Indexing Using API	2	

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓	✓		✓
CO 3	✓			✓
CO 4	✓			✓
CO 5		✓		✓
CO6				✓

References:

1. Cyber law -The Indian perspective by Pavan Duggal
2. Justice Yatindra Singh: Cyber Laws, Universal Law Publishing Co., New Delhi
3. Farouq Ahmed, Cyber Law in India, New Era publications, New Delhi

Programme	BSc Cyber Security Honours				
Course Title	Professional Skill Development for IT Career Excellence				
Type of Course	VAC				
Semester	IV				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	1. Basic Mathematics 2. Basic English reading and Writing Skills				
Course Summary	The course provides a comprehensive overview of essential skills and knowledge relevant to success in information technology. It covers various topics, including personal development, communication, quantitative reasoning, programming, software development, and web technologies.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will demonstrate effective communication skills, including verbal and written communication, and adhere to professional etiquette standards in various contexts, including digital communication.	Ap	C	Assignment / Instructor-created exams / Quiz
CO2	Students will develop job readiness skills, including resume writing, job application preparation, and interview techniques, to enhance their employability and succeed in job interviews.	E	C	Assignment / Instructor-created exams / Quiz
CO3	Students will collaborate effectively in group discussions and presentations, demonstrating teamwork, leadership, and critical thinking skills in diverse group settings.	Ap	C	Assignment / Instructor-created exams / Quiz
CO4	Students will apply quantitative and logical reasoning skills to solve mathematical problems, analyse data, and make informed decisions in various contexts, including financial and analytical reasoning.	Ap	C	Assignment / Instructor-created exams / Quiz
CO5	Students will understand fundamental programming concepts, data structures, and database principles,	Ap	C	Assignment / Instructor-created exams /

	and apply them to solve computational problems and develop software applications.			Quiz
CO6	The student will be able to learn areas and skills essential for success in the IT industry, including communication, problem-solving, programming, and technology integration.	Ap	C	Assignment / Instructor-created exams / Quiz
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus

Module	Unit	Content	Hrs (36+9)	Marks 50
I		**Introduction to Soft Skills and Academic Skills**	**10**	**15**
	1	Personality Development: Knowing Yourself, Positive Thinking, Communication Skills, Professional Etiquette	2	
	2	Employment Communication: Introduction, Resume, Curriculum Vitae, Developing an Impressive Resume, Job Application or Cover Letter	2	
	3	Job Interviews: Definition of Interview, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips	2	
	4	Group Discussion: Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Preparing the Presentation, Delivering the Presentation	2	
	5	HR round: Self Introduction, Strength and Weakness Analysis, Scenario-Based Tasks, Body Language, Positive Attitude	2	
II		**Basic Aptitude Skills**	**9**	**15**
	6	Number System: HCF and LCM, Decimal Fraction, Problems on Age	2	
	7	Square Root, Cube Root, Problems on Numbers,	1	
	8	Problems on Speed, Time and Distance, Percentage, Problems on Trains	2	
	9	Profit and Loss, Ratio and Proportion, Partnership	2	
	10	Simple Interest, Compound Interest, Chain Rule, Problems on Callender and Clock	2	
	Reasoning Skills Development		**9**	**10**

III	11	Verbal Reasoning: Antonym and Synonym, Verbal Analogies, Spotting Errors, Ordering Words, Sentence correction, Fill in blanks, Replace the word, Idioms and Phrases	3	
	12	Logical Reasoning Aptitude: Series: Missing Numbers, Odd One Out, Assumptions and Conclusions, Alpha-Numeric Sequence Puzzle, Number, Ranking & Time Sequence Test	3	
	13	Non-Verbal Reasoning: Choosing the Missing Figure in a Series, Choosing the Set of Similarly Related Figures, Dot Situation, Basic Analytical Reasoning	3	
IV	**Technical Skills and Programming Skills**		**8**	**10**
	14	Concept of Procedure-Oriented Programming and Object-Oriented Programming, Basic structure of C Programming	2	
	15	Data Structures: Array, Linked list, Stack, Queue, Tree and Graphs (Concept Only)	2	
	16	Database Concept: ER Model, Normalisation, ACID Property, DML and DDL	2	
	17	Basic Concept of SDLC, Agile Model(Concept Only), Blackbox and Whitebox Testing(Concept)	2	
V	**Open Ended Module- Application Level**		**9**	
		Assign the tasks from the following ● Writing an impressive resume ● Active listening and feedback mechanisms ● Conduct Ice breaking Session ● Assign students to participate in a group discussion on a given topic and write a reflective analysis of their experience, including observations on communication dynamics, collaboration, and leadership. ● Pair students and assign roles (interviewer and interviewee) to conduct mock interviews based on various scenarios, such as behavioural questions, technical challenges, or situational inquiries. ● Task students with designing and delivering a professional presentation on a topic related to their field of study or interest, incorporating effective visual aids, storytelling techniques, and audience engagement strategies. ● Conduct low-level Aptitude tests, including Verbal and Non-Verbal Reasoning. ● Conduct high-level Aptitude tests, including Verbal and Non-Verbal Reasoning. ● Writing Simple programming in any language. ● Assign students to research and analyse a real-world software development project, applying		

		concepts of the Software Development Life Cycle (SDLC)		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	1	3	2	1	-	-						
CO 2	1	1	2	1	-	-						
CO 3	-	3	1	1	-	-						
CO 4	-	3	3	2	-	-						
CO 5	-	1	3	3	1	-						
CO 6	-	1	3	3	1	-						

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5	✓	✓		✓

CO 6	✓	✓		✓

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