

Pimpri Chinchwad Education Trust's

Pimpri Chinchwad University

Sate, Maval, Pune - 412106



**PCET's
Pimpri
Chinchwad
University**

Learn | Grow | Achieve

Curriculum Structure

B.Sc. Computer Science (Cyber Security)

(2026 Pattern)

School of Computer Applications

Choice Based Credit System (CBCS)



Effective from Academic Year 2026-27

B.Sc. Computer Science (Cyber Security) Curriculum

Preamble:

At Pimpri Chinchwad University, we present the Bachelor of Science (Cyber Security), an Undergraduate Program designed to equip students with a comprehensive understanding of Computer Science and Cyber Security. As aspiring professionals in the field of computing, we acknowledge the weight of responsibility that accompanies our education. Upholding the highest standards of integrity, professionalism, and ethical conduct is fundamental to our academic pursuits and beyond. We embrace the imperative of continuous learning and adaptability in an era marked by rapid technological advancement, pledging to proactively seek new knowledge and master emerging technologies.

The BSc (Cyber Security) program curriculum is designed to provide students with the practice of protecting computer systems, networks, and data from digital threats, such as unauthorized access, data breaches, malware, and other cyber-attacks.

Overall, a BSc (Cyber Security) program aims to provide students with a well-rounded education that prepares them for a successful career in the IT industry and for further academic pursuits.

Vision and Mission of Program:

Vision:

To be recognized as a global leader in computer applications and technology education, renowned for producing highly skilled, ethical, and resourceful professionals who are ready to make a significant impact on the world.

Mission:

To cultivate a dynamic and inclusive learning environment that fosters creativity, critical thinking, and technical proficiency. We aim to equip our students with the skills needed to solve complex problems and drive technological innovation in their respective fields.

Program Educational Objectives:

Here are some possible Program Educational Objectives (PEOs) for a Bachelor of Science (Cyber Security).

1. To prepare youth to take up positions as secure software designers and developers.
2. To aim at the development of knowledge and skills for defending and developing secure software systems.
3. To prepare students with social interaction skills, communication skills, life skills, entrepreneurial skills, and research skills which are necessary for career growth and for leading a quality life.

Program Outcome

Here are some possible Program Outcomes (POs) for a Bachelor of Science (Cyber Security) program: -

PO 1: Develop Core Competencies: The program aims to develop the core competencies required for a career in computer science and Cyber Security.

PO 2: Develop Practical Cyber security Skills: The program focuses on equipping students with practical skills required for securing computer systems and networks.

PO 3: Analyze and Mitigate Security Risks: The program emphasizes the importance of risk management and equips students with the knowledge to make informed decisions regarding security measures.

PO 4: Foster Ethical and Professional Practices: The program instills ethical and professional values in students, emphasizing the importance of integrity, privacy, and responsible use of cyber security knowledge and skills.

PO 5: Promote Critical Thinking and Problem-Solving Abilities: The program aims to develop students' analytical and problem-solving skills in the context of cyber security.

PO 6: Collaborate and Communicate Effectively: The program emphasizes the importance of teamwork and effective communication skills. These skills are essential for working effectively in multidisciplinary cyber security teams and conveying complex concepts to various stakeholders.

PO 7: Stay Updated with Emerging Technologies and Trends: The program aims to keep students abreast of the rapidly evolving field of cyber security. They are encouraged to stay updated with emerging technologies, trends, and research advancements in cyber security.

PO 8: Establishing strategies in developing and implementing ideas in multi- disciplinary environments using computing, cyber security and management skills as a member or leader in a team.

PO 9: Contribute to progressive community and society in comprehending different cyber security activities.

PO 10: Gain confidence for self and continuous learning to improve knowledge and competence as a member or leader of a team.

PO11: Communication Skills: Express thoughts and ideas effectively in writing and orally; communicate with others using appropriate medium; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO12: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes to identify and detect Cyber Vulnerabilities and resolve new Cyber Threats.

Program Specific Outcomes

On successful completion of the programme, the graduates of Bachelor of Science (Cyber Security) programme will be able to:

PSO1: -Resolve security issues in computer networks and maintenance of Cyber Security systems to secure an IT infrastructure.

PSO2: -Provide Security Based Solutions with to solve real life problems like malware, phishing, spamming and other Cyber Threats, related to Cyber Security.

PSO3: -Design, Implement, and Monitor-Cyber Security Mechanisms, to ensure the protection of Information Technology Assets through Advanced Penetration Testing and Reverse Engineering to get to know the perspective of Cyber Criminals.

INDEX

Sr. No.	Content	Pg. No.
1.	Curriculum Framework	6-7
2.	Course Code Nomenclature	8
3	Program Structure	9-20
4.	Course Details: Semester – I	21
I.	Programming Fundamentals using C	22-23
II.	Programming Fundamentals using C Lab	24-26
III.	Web Technology	27-28
IV.	Web Technology Lab	29-30
V.	Discrete Mathematics	31-32
VI.	DSC Elective-I: Fundamentals of Computer Architecture	33-34
VII.	DSC Elective-I: Computer Organization And Security Basics	35-36
VIII.	Software Engineering	37-38
IX.	Applied Communication	39-40
X.	Foreign Language-I	41-44
XI.	Indian Knowledge System	45-46
XII.	UHV-I	47-48
XIII.	Cyber Security in IoT	49-50
5.	Course Details: Semester – II	51
I.	Advanced C Programming	52-53
II.	Advanced C Programming Lab	54-57
III.	Database Management System	58-59
IV.	Database Management System Lab	60-61
V.	Discrete Mathematics	31-32
VI.	DSC Elective-I: Fundamentals of Computer Architecture	33-34
VII.	DSC Elective-I: Computer Organization And Security Basics	35-36
VIII.	Software Engineering	37-38
IX.	Applied Communication	39-40
X.	Foreign Language-II	62-66
XI.	AI in Cyber Security	67-68
XII.	Database Security and SQL Attacks	69-70
XIII.	Data Science & Data Analytics using R	70-71
XIV.	Exit Policy-UG CERTIFICATE: Digital Systems and Cyber Fundamentals	72-73

CURRICULUM FRAMEWORK

Sr. No.	Type of course	Abbreviations
1	Major(DSC)	DSC
2	Elective (Minor Stream/Vocational/Program Specific)	MIN
4	Ability Enhancement Courses	AEC
5	Skill Enhancement Courses	SEC
6	Vocational Skill Course	VSC
7	Value Added Courses	VAC
8	Summer Internship/ On Job Training	OJT
9	Project	PROJ
10	Field Project	FP
11	Indian Knowledge System	IKS
12	Co-Curricular	CC
13	Community Engagement Program	CEP
14	Value Education Course	VEC
15	Massive Open Online Courses	MOOC

CREDIT DISTRIBUTION (2026 PATTERN): SEMESTER WISE

Sr. No.	Type of course	No. of Credits/Semester									Total (Honours)	No. of Credits		Total (Honours with Research)
		1	2	3	4	5	6	Total	7	8		7	8	
1	Major(DSC)	MAX:13-MIN:10	MAX:11-MIN:8	MAX:11-MIN:8	MAX:12-MIN:9	MAX:10-MIN:10	MAX:10-MIN:10	61	MAX:14-MIN:14	MAX:18-MIN:18	93	MAX:10-MIN:10	MAX:14-MIN:14	85
2	Major Elective (Interdisciplinary)	MAX:3-MIN:0	MAX:3-MIN:0	MAX:3-MIN:0	MAX:3-MIN:0	MAX:3-MIN:3		9	MAX:4-MIN:4		13	MAX:4-MIN:4		13
3	Multidisciplinary	-	-	MAX:3-MIN:3	MAX:3-MIN:3	MAX:3-MIN:3		9			9			9
4	Ability Enhancement Courses/Sports/Yoga	MAX:3-MIN:1	MAX:3-MIN:1	MAX:3-MIN:1	MAX:3-MIN:1			6			6			6
5	Skill Enhancement Courses/ Internship/Dissertation	MAX:2-MIN:0	MAX:2-MIN:0	MAX:3-MIN:1	MAX:2-MIN:0	MAX:6-MIN:6	MAX:12-MIN:12	22	MAX:4-MIN:4		26	MAX:4-MIN:4		26
6	VAC(IKS/RM/Open Elective/Research Project)	MAX:3-MIN:3	MAX:4-MIN:4	MAX:2-MIN:2	MAX:2-MIN:2			11		MAX:4-MIN:4	15	MAX:4-MIN:4	MAX:8-MIN:8	23
7	MOOC (Swayam/Coursera)	MAX:3-MIN:3	MAX:4-MIN:4	MAX:2-MIN:2	MAX:2-MIN:2	-		14			14			14
Total		22	22	22	22	22	22	132	22	22	176	22	22	176

Course Code Nomenclature

COURSE CODE	COURSE NAME	COURSE TYPE
SEMESTER-I		
U26BSCS101	Programming Fundamentals using C	DSC
U26BSCS111	Programming Fundamentals using C Lab	DSC
U26BSCS102	Web Technology	DSC
U26BSCS112	Web Technology Lab	DSC
U26BSCS103	Discrete Mathematics	DSC (CBCS-1)
U26BSCS104	DSC Elective-I:Computer Architecture	DSCE(CBCS-1)
U26BSCS105	DSC Elective-I:Fundamental of Information Technology	
U26BSCS106	Software Engineering	SEC(CBCS-2)
U26BSCS107	Applied Communication	AEC (CBCS-2)
	Foreign Language-I	AEC
U26BSCS108	Indian Knowledge System	VAC
	UHV-I	VAC
U26BSCS109	Cyber Security in IoT	MOOC
SEMESTER-II		
U26BSCS201	Advanced C Programming	DSC
U26BSCS211	Advanced C Programming Lab	DSC
U26BSCS202	Database Management System	DSC
U26BSCS212	Database Management System Lab	DSC
U26BSCS103	Discrete Mathematics	DSC (CBCS-1)
U26BSCS104	DSCElective-I:Computer Architecture	DSCE(CBCS-1)
U26BSCS105	DSCElective-I:Introduction to OOPs	
U26BSCS106	Software Engineering	SEC(CBCS-2)
U26BSCS107	Applied Communication	AEC(CBCS-2)
	Foreign Language-II	AEC
U26BSCS203	AI in Cyber Security	VAC
U26BSCS204	Database Security And Sql Attacks	VAC
U26BSCS205	Data Science & Data Analytics using R	MOOC

B.Sc. Computer Science (Cyber Security)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER-I

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME				
			TH	P R	TU T	CRE DIT	HRS		CIA	ESA	PR/ OR	TOTAL
U26BSCS101	DSC	Programming Fundamentals using C	3	-	-	3	3		40	60		100
U26BSCS111	DSC	Programming Fundamentals using C lab	-	2	-	2	4		50		50	100
U26BSCS102	DSC	Web Technology	3	-	-	3	3		40	60		100
U26BSCS112	DSC	Web Technology Lab	-	2	-	2	4		50		50	100
U26BSCS103	DSC (CBCS-1)	*Discrete Mathematics	3	-	-	0-3	3		40	60		100
U26BSCS104/ U26BSCS105	DSCE (CBCS-1)	* DSC Elective-I	3	-	-	0-3	3		40	60		100
U26BSCS106	SEC (CBCS-2)	*Software Engineering	2	-	-	0-2	2		20	30		50
U26BSCS107	AEC (CBCS-2)	*Applied Communication	2	-	-	0-2	2		50	-		50
	AEC	Foreign Language-I	2	-	-	1	2		50	-	-	50
U26BSCS108	IKS	Indian Knowledge System	2	-	-	1	2		50			50
	VAC	UHV-I	2	-	-	2	2		50	-	-	50
U26BCSCS109	MOOC	Cyber Security in IoT	3	-	-	3	3		40	60		100
TOTAL			19-20	4	0	22	27-28				100	800

DSC Elective – I

U26BSCS104	DSCE (CBCS-1)	Fundamentals of Computer Architecture	3	-	-	3	3		40	60	-	100
U26BSCS105		Computer Organization and Security Basics	3	-	-	3	3		40	60	-	100

Foreign Language – I

UFL101A	AEC	Foreign Language – I: German	2	-	-	-	2		50	-	-	50
UFL201B	AEC	Foreign Language – I: Japanese	2	-	-	-	2		50	-	-	50
UFL101C	AEC	Foreign Language – I: Korean	2	-	-	-	2		50	-	-	50

Note: * Student may opt for the course either in Sem-I/Sem-II, under the choice-based credit system

B.Sc. Computer Science (Cyber Security)
2026 Pattern (AS PER NEP 2020)
CURRICULUM STRUCTURE

SEMESTER-II												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TUT	CREDITS	HRS		CIA	ESA	PR/OR	TOTAL
U26BSCS201	DSC	Advanced C Programming	3	-	-	3	3		40	60		100
U26BSCS211	DSC	Advanced C Programming Lab	-	1	-	1	2		50		50	100
U26BSCS202	DSC	Database Management System	3	-	-	3	3		40	60		100
U26BSCS212	DSC	Database Management System Lab	-	1	-	1	2		50		50	100
U26BSCS103	DSC (CBCS-1)	*Discrete Mathematics	3	-	-	0-3	3		40	60		100
U26BSCS104/ U26BSCS105	DSCE(CBCS-1)	*DSC Elective-I	3	-	-	0-3	3		40	60		100
U26BSCS106	SEC (CBCS-2)	*Software Engineering	2	-	-	0-2	2		20	30		50
U26BSCS107	AEC(CBCS-2)	*Applied Communication	2	-	-	0-2	2		50	-		50
	AEC	Foreign Language-II	2	-	-	1	2		50	-	-	50
U26BSCS203	VAC	AI in Cyber Security	2	-	-	2	2		20	30		50
U26BSCS204	VAC	Database Security and SQL Attacks	2	-	-	2	2		50	-		50
U26BSCS205	MOOC	Data Science & Data Analytics using R	3	-	1	4	5		40	60		100
TOTAL			20 - 21	02	01	22	24-25				100	800
DSC Elective – I												
U26BSCS104	DSCE (CBCS-1)	Fundamentals of Computer Architecture	3	-	-	3	3		40	60	-	100
U26BSCS105		Computer Organization and Security Basics	3	-	-	3	3		40	60	-	100
Foreign Language – II												
	AEC	Foreign Language – II: German	2	-	-	-	2		50	-	-	50
	AEC	Foreign Language – II: Japanese	2	-	-	-	2		50	-	-	50
	AEC	Foreign Language – II: Korean	2	-	-	-	2		50	-	-	50

Note: * Student may opt for the course either in Sem-I/Sem-II, under the choice-based credit system

Exit Policy: UG Certificate in B.Sc. Computer Science (Cyber Security): A Students who opt to exit after completion of the first year and have scored the required credits offered by the school in the program structure will be awarded a UG certificate in **B.Sc. Computer Science (Cyber Security)**, provided they must earn additional credits during the summer vacation of the first year

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TUT	CRE DIT	Hrs		CIA	ESA	PR/OR	TOTAL
UCEXBC101	VSC	Digital Systems and Cyber Fundamentals	2	-	-	2	2		50	-	-	50
UCEXBC102	VSC	Project	-	2	-	4	8		-	-	100	100

B.Sc. Computer Science (Cyber Security)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER-III

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME			
			TH	P R	TU T	CRED IT	HRS	CI A	ES A	PR/OR	TOTAL
U26BSCS301	DSC	Data Structure using C	3	-	-	3	3	40	60		100
U26BSCS311	DSC	Data Structure using C Lab.	-	1	-	1	2	50		50	100
U26BSCS302	DSC	Data Communication & Networking	3	-	-	3	3	40	60	-	100
U26BSCS312	DSC	Data Communication & Networking Lab	-	1	-	1	2	50		50	100
U26BSCS303	DSC (CBCS-1)	*Numerical Methods	3	-	-	0-3	3	40	60		100
U26BSCS304 / U26BSCS305	DSCE(CB CS-1)	*DSCElective–II	3	-	-	0-3	3	40	60		100
U26BSCS306	SEC (CBCS-2)	*Search Engine Optimization	2	-	-	0-2	2	20	30		50
U26BSCS307	AEC(CBCS)	*Professional Writing	2	-	-	0-2	2	50	-		50
	AEC	Foreign Language-III	2	-	-	1	2	50	-	-	50
U26BSCS308	VAC	Sports/Yoga/Cultural Activities/Club Activities	2	-	-	1	2	50	-		50
U26BSCS309	VAC	Rural Immersion/Community Engagement Project	2	-	-	1	2	50	-	-	50
U26BSCS310	MOOC	Cyber Laws and Digital Ethics	2	-	-	2	2	20	30		50
U26BSCS313	SEC	Capstone: ALR	-	2	-	1	2	50	-	-	50
	MDM	MINOR-I	3	-	1	3	4	40	60		100
TOTAL			20-21	02	01	22	25-26			100	900
Foreign Language – III											
	AEC	Foreign Language – III: German	2	-	-	-	2	50	-	-	50
	AEC	Foreign Language – III: Japanese	2	-	-	-	2	50	-	-	50
	AEC	Foreign Language – III: Korean	2	-	-	-	2	50	-	-	50
DSC Elective – II											
U26BSCS304	DSCE	Statistical Methods and Tools for Cyber Security	3	-	-	3	3	40	60	-	100
U26BSCS305	DSCE	Data Analysis for Cyber Security	3	-	-	3	3	40	60	-	100

Note: *Student may opt for the course either in Sem-I/Sem-II, under the choice-based credit system

B.Sc. Computer Science (Cyber Security)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER-IV												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TUT	CREDIT	HRS		CIA	ESA	PR/OR	TOTAL
U26BSCS401	DSC	Operating Systems	3	-	-	3	3		40	60	-	100
U26BSCS411	DSC	Operating Systems Using Linux Lab	-	2	-	2	4		50		50	100
U26BSCS402	DSC	Python Programming	3	-	-	3	3		40	60		100
U26BSCS412	DSC	Python Programming Lab.	-	2	-	2	4		50		50	100
U26BSCS303	DSC(CB CS-1)	Numerical Methods	3	-	-	0-3	3		40	60		100
U26BSCS304/ U26BSCS305	DSCE (CBCS-1)	DSC Elective-II	3	-	-	0-3	3		40	60		100
U26BSCS306	SEC (CBCS-2)	*Search Engine Optimization	2	-	-	0-2	2		20	30		50
U26BSCS307	AEC (CBCS-2)	*Professional Writing	2	-	-	0-2	2		50	-		50
U26BSCS403	AEC	Foreign Language-IV	2	-	-	1	2		50	-	-	50
U26BSCS404	VAC	Sports/Yoga/Cultural Activities/Club Activities	2	-	-	1	2		50	-		50
U26BSCS405	VAC	Rural Immersion/Community Engagement Project	2	-	-	1	2		50	-	-	50
U26BSCS406	MOOC	Artificial Intelligence in Cyber Security	2	-	-	2	2		20	30		50
	MDM	MINOR-II	3	-	-	3	4		40	60		100
TOTAL			19-20	4	0	22	28-29				100	850
Foreign Language – II												
	AEC	Foreign Language – IV: German	2	-	-	-	2		50	-	-	50
	AEC	Foreign Language – IV Japanese	2	-	-	-	2		50	-	-	50
	AEC	Foreign Language – IV: Korean	2	-	-	-	2		50	-	-	50

DSC Elective – II												
U26BSCS304	DSCE	Statistical Methods and Tools for Cyber Security	3	-	-	3	3		40	60	-	100
U26BSCS305	DSCE	Data Analysis for Cyber Security	3	-	-	3	3		40	60	-	100

Note: * Student may opt for the course either in Sem-I/Sem-II, under the choice-based credit system

Exit Policy: UG Diploma in B.Sc. Computer Science (Cyber Security): A Students who opt to exit after completion of the second year and have scored the required credits offered by the school in the program structure will be awarded a UG certificate in **B.Sc. Computer Science (Cyber Security)**, provided they must earn additional credits during the summer vacation of the second year.

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TUT	CREDIT	Hrs.		CIA	ESA	PR/ OR	TOTAL
UDIEXBC201	VSC	Cyber Security Tools and Techniques	2	-	-	2	2		-	-	50	50
UDIEXBC202	VSC	Project	-	4	-	4	8		50	-	50	100

B.SC. COMPUTER SCIENCE (CYBER SECURITY)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER V

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME					ASSESSMENT SCHEME				
			T H	PR	TU T	CRE DIT	HR S		CIA	ESA	PR /O R	TOTAL
U26BSCS501	DSC	Ethical Hacking	3	-	-	3	3		40	60	-	100
U26BSCS511	DSC	Ethical Hacking Lab	-	2	-	2	4		50	-	50	100
U26BSCS502	DSC	Mobile Security	3	-	-	3	3		40	60	-	100
U26BSCS512	DSC	Mobile Security Lab	-	2	-	2	4		50	-	50	100
U26BSCS503/ U26BSCS504	DSCE	DSC Elective-III	3	-	-	3	3		40	60	-	100
U26BSCS505	SEC	Capstone Program-ALR+ Soft Skill (Summer Break)	-	3	-	3	-		50	-	50	100
U26BSCS506	PROJ	Internship	3	-	-	3	3		50	-	50	100
	MDM	Minor – III	3	-	-	3	3		40	60	-	100
TOTAL			14	4	0	22	22		360	240	200	800
DSC Elective – III												
U26BSCS503	DSCE	Incident Response and Threat Handling	3	-	-	3	3		40	60	-	100
U26BSCS504	DSCE	Security Operations Center (SOC) Fundamentals	3	-	-	3	3		40	60	-	100

B.SC. COMPUTER SCIENCE (CYBER SECURITY)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER VI SCHEME A

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TU T	CRED IT	HR S		CIA	ESA	PR/OR	TOTAL
U26BSCS601	DSC	Vulnerability Assessment and Penetration Testing	3	-	-	3	3		40	60		100
U26BSCS611	DSC	Vulnerability Assessment and Penetration Testing Lab	-	2	-	2	4		50	-	50	100
U26BSCS602	DSC	Malware Analysis and Reverse Engineering	3	-	-	3	3		40	60		100
U26BSCS612	DSC	Malware Analysis and Reverse Engineering Lab	-	2	-	2	4		50	-	50	100
U26BSCS603	PROJ	Internship/Project	-	4	-	12	12		250		250	500
TOTAL			6	8	0	22	26		430	120	350	900

SEMESTER VI SCHEME B

COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TU T	CRED IT	HR S		CIA	ESA	PR/OR	TOTAL
U26BSCS601	MOOC	Vulnerability Assessment and Penetration Testing	3	-	-	3	3		40	60		100
U26BSCS611	MOOC	Vulnerability Assessment and Penetration Testing Lab	-	2	-	2	4		50	-	50	100
U26BSCS602	MOOC	Malware Analysis and Reverse Engineering	3	-	-	3	3		40	60		100
U26BSCS612	MOOC	Malware Analysis and Reverse Engineering Lab	-	2	-	2	4		50	-	50	100
U26BSCS603	PROJ	Internship/Project	-	4	-	12	12		250		250	500
TOTAL			6	8	0	22	26		430	120	350	900

B.SC. COMPUTER SCIENCE (CYBER SECURITY)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER VII(Honours)												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	P R	TU T	Credit	Hrs		CI A	ES A	PR/OR	TO TAL
U26BSCS701	DSC	Mobile Forensic	3	-	-	3	3		40	60	-	100
U26BSCS711	DSC	Mobile Forensic Lab	-	2	-	2	4		50	-	50	100
U26BSCS702	DSC	Digital Forensic	3	-	-	3	3		40	60	-	100
U26BSCS712	DSC	Digital Forensic Lab	-	2	-	2	4		50	-	50	100
U26BSCS703	DSC	Security in Blockchain	4	-	-	4	4		40	60	-	100
U26BSCS704/ U26BSCS705	DSCE	DSC Elective – IV	4	-	-	4	4		40	60	-	100
U26BSCS706	SEC	Cyber Threat Intelligence and Analysis	4	-	-	4	4		40	60	-	100
		TOTAL	18	4	0	22	22	0	300	300	100	700
DSC Elective – IV												
U26BSCS704	DSCE	Cyber Security Audit and Compliance	4	-	-	4	4		40	60	-	100
U26BSCS705	DSCE	Cyber Risk Assessment and Governance	4	-	-	4	4		40	60	-	100

B.SC. COMPUTER SCIENCE (CYBER SECURITY)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER-VIII(Honours)												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TU	CREDIT	HRS		CIA	ESA	PR / OR	TOTAL
U26BSCS801	DSC	Advanced SOC Operations & Incident Response	3	-	-	3	3		40	60		100
U26BSCS811	DSC	Advanced SOC Operations & Incident Response Lab	-	2	-	2	4		50	-	50	100
U26BSCS802	DSC	Advanced Network Defence& IDS/IPS Tuning	3	-	-	3	3		40	60		100
U26BSCS812	DSC	Advanced Network Defence& IDS/IPS Tuning Lab	-	2	-	2	4		50	-	50	100
U26BSCS803	DSC	Security Operations and SOC Management	4	-	-	4	4		40	60		100
U26BSCS804	DSC	Cloud Security and Governance	4	-	-	4	4		40	60		100
U26BSCS805	PROJ	Research Project				4	8		50	-	50	100
TOTAL			14	4	0	22	30		310	240	150	700

B.SC. COMPUTER SCIENCE (CYBER SECURITY)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER VII(Honours with Research Degree)												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	P R	TU T	Credit	Hrs		CI A	ES A	PR/ OR	TO TAL
U26BSCS701	DSC	Mobile Forensic	3	-	-	3	3		40	60		100
U26BSCS711	DSC	Mobile Forensic Lab	-	2	-	2	4		50	-	50	100
U26BSCS702	DSC	Digital Forensic	3	-	-	3	3		40	60		100
U26BSCS712	DSC	Digital Forensic Lab	-	2	-	2	4		50	-	50	100
U26BSCS704/ U26BSCS705	DSCE	DSC Elective – V	4	-	-	4	4		40	60	-	100
U26BSCS706	RM	Research Methodologies and Techniques	4	-	-	4	4		40	60	-	100
U26BSCS707	RP	Research Project-I	-	4	-	4	4		50	-	50	100
		TOTAL	14	8	0	22	28		310	240	150	700
DSC Elective – IV												
U26BSCS704	DSCE	Cyber Security Audit and Compliance	4	-	-	4	4		40	60	-	100
U26BSCS705	DSCE	Cyber Risk Assessment and Governance	4	-	-	4	4		40	60	-	100

B.SC. COMPUTER SCIENCE (CYBER SECURITY)
CURRICULUM STRUCTURE
2026 Pattern (AS PER NEP 2020)

SEMESTER-VIII(Honours with Research Degree)												
COURSE CODE	COURSE TYPE	COURSE NAME	TEACHING SCHEME						ASSESSMENT SCHEME			
			TH	PR	TUT	CREDIT	HRS		CIA	ESA	PR/OR	TOTAL
U26BSCS801	DSC	Advanced SOC Operations & Incident Response	3	-	-	3	3		40	60		100
U26BSCS811	DSC	Advanced SOC Operations & Incident Response Lab	-	2	-	2	4		50	-	50	100
U26BSCS802	DSC	Advanced Network Defence& IDS/IPS Tuning	3	-	-	3	3		40	60		100
U26BSCS812	DSC	Advanced Network Defence& IDS/IPS Tuning Lab	-	2	-	2	4		50	-	50	100
U26BSCS806	DSC	Security Operations and SOC Management	4	-	-	4	4		40	60		100
U26BSCS807	RP	Advanced SOC Operations & Incident Response	-	8	-	8	8		100	-	100	200
TOTAL			10	12	0	22	26		320	180	200	700

B.Sc. Computer Science (Cyber Security)
2026 PATTERN
COURSE DETAILS
Semester - I

Course Contents and Syllabus:

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Programming Fundamentals using C		Course Code and Course Type		U26BSCS101/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA(Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	-	3	3	40	60	-
Prerequisite:							
Course Objectives (CO):				The objectives of: 1. Introduce students to the fundamentals of problem solving and algorithmic thinking. 2. Develop basic programming skills using the C language. 3. Familiarize students with variables, operators, control structures, and functions. 4. Build logical reasoning for structured programming. 5. Prepare students for an advanced C programming course in the next semester.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Understand the structure and syntax of C programs. 2. Develop simple programs using operators and expressions. 3. Apply decision-making and looping constructs. 4. Use arrays, strings, and functions for modular programming. 5. Solve basic computational problems using C programming concepts.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I:		
Introduction to Programming and C Basics: Introduction to programming, Problem solving concepts - algorithm, flowchart, Features of C language, Structure of C program - documentation, declaration, executable section, Character set and tokens, Keywords and identifiers, Variables and constants - declaration, initialization, Data types - basic data types, Input and output statements - printf(), scanf(), Program compilation process - edit, compile, execute, Simple C programs	CLO 1	9
UNIT II:		
Operators and Expressions: Arithmetic operators - addition, subtraction, multiplication, division, modulus, Relational operators - comparison operations, Logical operators - AND, OR, NOT, Assignment operators - shorthand assignment, Increment and decrement operators - prefix, postfix, Conditional operator - ternary expression, Operator precedence and associativity, Type conversion - implicit and explicit conversion, Expression evaluation - numerical problem solving	CLO 2	9
UNIT III:		
Decision Making and Looping Statements: Decision making concepts, if statement - simple conditional execution, if-else statement - branching, Nested if statement, switch statement - menu-	CLO3	9

driven logic, Looping concepts, while loop - entry-controlled loop, do-while loop - exit-controlled loop, for loop - counter-based iteration, Nested loops - multiple iterations, break and continue statements, Programs using conditional and looping statements		
UNIT IV:		
Arrays and Strings: Introduction to arrays, One-dimensional arrays - declaration, initialization, Two-dimensional arrays - matrix representation, Array operations - traversal, searching, Character arrays, Introduction to strings, String input and output, String handling functions - strlen(), strcpy(), strcmp(), strcat(), String manipulation programs, Programs using arrays and strings	CLO4	9
UNIT V:		
Functions and Modular Programming: Introduction to functions, Need for modular programming, Function declaration - prototype, Function definition and calling, Function arguments - actual and formal parameters, Return values, Types of functions - with/without arguments and return type, Scope and lifetime of variables - local and global variables, Recursive functions - basics, Header files and library functions, Programs using functions	CLO5	9
Total Hours		45

Reference Books:

1. Programming in ANSI C – *E. Balagurusamy*
2. Let Us C – *Yashavant Kanetkar*
3. The C Programming Language – *Brian Kernighan and Dennis Ritchie*
4. Programming with C – *Byron Gottfried*
5. Problem Solving and Programming in C – *R.S. Salaria*

Text Books

6. The C Programming Language – (K&R) Most authoritative and classic book on C
7. Let Us C – Beginner-friendly, widely used in Indian universities
8. C Programming: A Modern Approach – Modern, structured, and very good for learning concepts clearly

Online Resources:

1. <https://www.w3schools.com/c/>
2. <https://www.programiz.com/c-programming>
3. <https://www.geeksforgeeks.org/c-programming-language/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Programming Fundamentals using C Lab		Course Codeand Course Type		U26BSCS111/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
-	2	-	2	4	50	-	50
Prerequisite:							
Course Objectives (CO):				The objectives are: 1. Introduce students to programming practice using C language in a Linux environment. 2. Develop problem-solving skills through hands-on coding. 3. Familiarize students with Linux terminal commands for compiling and executing C programs. 4. Build programming logic using control structures, arrays, strings, and functions. 5. Prepare students for advanced C programming laboratory work.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Write, compile, and execute C programs using GCC compiler in a Linux-based environment. 2. Develop structured C programs using variables, operators, and expressions. 3. Apply conditional and looping statements for problem-solving in C programming. 4. Develop programs using arrays, strings, and user-defined functions. 5. Debug, test, and improve program logic using standard C programming practices..			

CourseContents/Syllabus:Practical Plan

Activity Number	Assignment/Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Write a C program to perform basic input and output operations	Week 1/ Turn1and2	a. Print "Hello World". b. Display personal information. c. Read integer, float, and character from user. d. Display entered values using formatted output. e. Demonstrate escape sequences (\n, \t).	CLO1	4
2	Write a C program to perform	Week 2/	a. Addition, subtraction, multiplication, division. b. Calculate area of rectangle and circle.		

	arithmetic operations	Turn1and2	c. Swap two numbers. d. Convert Celsius to Fahrenheit. e. Calculate simple interest.	CLO1	4
3	Write a C program using conditional statements	Week 3/ Turn1and2	a. Find largest among two numbers. b. Find largest among three numbers. c. Check even or odd number. d. Check positive, negative, or zero. e. Determine voting eligibility.	CLO1	4
4	Write a C program using nested conditions	Week 4/ Turn1and2	a. Check leap year. b. Find smallest among three numbers. c. Grade calculation using percentage. d. Income tax calculation logic. e. Menu-based conditional program.	CLO1	4
5	Write a C program using switch case	Week 5/ Turn 1 and 2	a. Calculator using switch case. b. Display weekday from number. c. Menu-driven arithmetic operations. d. Unit conversion menu. e. Simple banking menu operations.	CLO2	4
6	Write a C program using looping statements	Week 6/ Turn 1 and 2	a. Print numbers 1–100. b. Display multiplication table. c. Sum of natural numbers. d. Reverse counting. e. Print even and odd numbers.	CLO2	4
7	Write a C program using iterative logic	Week 7/ Turn 1 and 2	a. Check prime number. b. Check palindrome number. c. Armstrong number. d. Perfect number. e. Strong number.	CLO3	4
8	Write a C program for number-based logic	Week 8/ Turn 1 and 2	a. Check prime number. b. Check palindrome number. c. Armstrong number. d. Perfect number. e. Strong number.	CLO3	4
9	Write a C program using nested loops	Week 9/ Turn 1 and 2	a. Star pattern printing. b. Pyramid pattern. c. Floyd's triangle. d. Multiplication table matrix. e. Number triangle patterns.	CLO3	4
10	Write a C program using one-dimensional arrays	Week 10/ Turn 1 and 2	a. Read array elements. b. Find largest and smallest element. c. Calculate sum and average. d. Search an element. e. Reverse array elements.	CLO4	4
11	Write a C program using two-dimensional arrays	Week 11/ Turn 1 and 2	a. Matrix addition. b. Matrix subtraction. c. Matrix transpose. d. Matrix Multiplication. e. Diagonal element display.	CLO4	4
12	Write a C program using strings	Week 12/ Turn 1 and 2	a. String length calculation. b. String copy. c. String comparison. d. String concatenation. e. Reverse a string.	CLO5	4

13	Write a C program using functions	Week 13/ Turn 1 and 2	a. Function for addition. b. Function for factorial. c. Function for prime number check. d. Function for largest number. e. Function for palindrome check.	CLO5	4
14	Write a C program using recursion	Week 14/ Turn 1 and 2	a. Recursive factorial. b. Recursive Fibonacci. c. Sum of natural numbers using recursion.	CLO5	4
15	Write a C program using combined concepts	Week 15/ Turn 1 and 2	a. Menu-driven program using functions. b. Student marks calculation using arrays and conditions. c. Employee salary calculation using functions and loops. d. String palindrome check using functions. e. Number-based menu program combining loops and conditions.	CLO5	4

Learning resources

Textbooks

1. Programming in ANSI C – Beginner-friendly textbook covering C fundamentals, operators, arrays, and functions.
2. Let Us C – Widely used academic book with simple examples and practice programs.
3. Programming with C – Good for structured learning and laboratory-oriented exercises.
4. Programming in C – Practical introduction to C programming with examples.
5. C Programming: A Modern Approach – Strong conceptual coverage for foundational C learning.

Reference Books

1. The C Programming Language – Classic reference book written by the creators of C.
2. C in a Nutshell – Concise reference for syntax and standard libraries.
3. Practical C Programming – Useful for lab practice and coding techniques.
4. Head First C – Visual and activity-based learning for beginners.
5. C: How to Program – Detailed programming exercises and examples.

Online Resources

1. <https://www.w3schools.com/c/>
2. <https://www.programiz.com/c-programming>
3. <https://www.geeksforgeeks.org/c-programming-language/>
4. <https://www.learn-c.org/>
5. <https://www.tutorialspoint.com/cprogramming/index.htm>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Web Technology		Course Code and Course Type		U26BSCS102/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	-	3	3	40	60	-
Prerequisite:							
Course Objectives (CO):				The objectives of Web Technologies are: 			
Course Learning Outcomes (CLO):				Students will be able to: 			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I		
Basics of Internet and Web: Introduction to Internet and Web, Web Browsers and Web Servers, Static and Dynamic Web Pages, Client-side and Server-side Scripting, Web Protocols (HTTP, HTTPS), Web Hosting concepts, Domain Name System (DNS), URL structure	CLO 1	9
UNIT II		
HTML5 Fundamentals: Introduction to HTML5, Document structure, Metadata, Headings, Paragraphs, Text formatting, Lists, Links, Images, Tables, Forms and input types, Multimedia elements (audio, video), Semantic elements.	CLO 2	9

UNIT III		
CSS for Web Design: Introduction to CSS and CSS3, Types of CSS (inline, internal, external), Selectors and properties, Text and font styling, Colors and backgrounds, Box model (margin, padding, border), Layout techniques (Flexbox basics), Positioning and display, Introduction to responsive design and media queries.	CLO3	9
UNIT IV		
JavaScript and DOM Manipulation: Introduction to JavaScript, Variables and data types, Operators and control statements, Functions, Arrays, Events and event handling, Document Object Model (DOM), DOM manipulation (changing content and styles), Form validation using JavaScript.	CLO4	9
UNIT V		
Dynamic Web Page Development: JavaScript objects and methods, Built-in functions, working with forms and validations, Dynamic content generation, Introduction to browser developer tools, Debugging basics, best practices in web development	CLO5	9
Total Hours		45

Learning resources

Textbooks:

1. Learn HTML for Beginners: The Illustrated Guide to Coding Paperback, Jo Foster
2. HTML: A Beginner's Guide, Fifth Edition: A Beginner's Guide, Fifth Edition: Courselead e-book for HTML A BEGINNERS GD 5E, Wendy Willard.

Reference Books:

1. JavaScript for Absolute Beginners (Expert's Voice in Web Development) Paperback, by Terry McNavage (Author)
Learn JavaScript Quickly: A Complete Beginner's Guide to Learning JavaScript, Even If You're New to Programming by Code Quickly.

Online Resources and E-Learning Resources

1. <https://www.w3schools.com/html/>
2. <https://www.tutorialspoint.com/html5/index.html>
3. <https://javascript.info/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Web Technology Lab		Course Code and Course Type		U26BSCS112/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
-	2	-	2	4	50	-	50
Prerequisite:							
Course Objectives (CO):				The objectives of Web Technologies are: 1. To recall different components and technologies of the World Wide Web as a platform. 2. To recognize HTML5 elements and components. 3. To apply knowledge of HTML5 and CSS. 4. Develop responsive web designs that adapt to various devices, and use JavaScript to enhance user interactivity and create dynamic web applications. 5. To Design and develop websites using fundamental web languages, technologies, and tools.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Identify basic web development methodologies. 2. Comprehend static web-based application using suitable client-side web technologies 3. Apply knowledge of foundational understanding of web development concepts for further study. 4. Analyze and create responsive layouts that adapt to various devices and screen sizes. 5. Evaluate the JavaScript, enabling dynamic content generation, effective event handling, and efficient DOM traversal techniques.			

Course Contents/Syllabus: Practical Plan

Activity Number	Assignment/Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Write a HTML program for the demonstration of Lists.	Week 1/ Turn 1 and 2	a. Unordered List b. Ordered List c. Definition List d. Nested List	CLO1	4
2	Write a HTML program for demonstrating Hyperlinks.	Week 2/ Turn 1 and 2	Navigation from one page to another. Navigation within the page.	CLO1	4

3	Assignment on HTML5 Table Element	Week 3/ Turn 1 and 2	Write a HTML program for time-table using tables.	CLO1	4
4	Create Home Page using HTML5	Week 4/ Turn 1 and 2	Write a HTML program to develop a static Home Page using frames.	CLO1	4
5	Create Registration Page using HTML5	Week 5/ Turn 1 and 2	Write a HTML program to develop a static Registration Form.	CLO2	4
6	Create Login Page using HTML5	Week 6/ Turn 1 and 2	Write a HTML program to develop a static Login Page.	CLO2	4
7	Create Product catalog.	Week 7/ Turn 1 and 2	Write a HTML program to develop a static Web Page for Catalog.	CLO3	4
8	Create CSS	Week 8/ Turn 1 and 2	Write HTML for demonstration of cascading style sheets. a. Embedded stylesheets. b. External stylesheets. c. Inline styles.	CLO3	4
9	Create Login page using Javascript Validation	Week 9/ Turn 1 and 2	Write a JavaScript program to validate the USER LOGIN page.	CLO3	4
10	Create Registration page using Javascript Validation	Week 10/ Turn 1 and 2	Write a JavaScript program for validating REGISTRATION FORM	CLO4	4
11	Event Handling	Week 11/ Turn 1 and 2	Background Color Change	CLO4	4
12	Event Handling	Week 12/ Turn 1 and 2	Calendar for the month and year by combo box [APL]	CLO5	4
13	Event Handling	Week 13/ Turn 1 and 2	OnMouseover event	CLO5	4
14	Event Handling	Week 14/ Turn 1 and 2	OnMouseover using objects	CLO5	4
15	Application	Week 15/ Turn 1 and 2	Online Exam [APL]	CLO5	4

Learning resources

Textbooks:

1. Learn HTML for Beginners: The Illustrated Guide to Coding Paperback, Jo Foster
2. HTML: A Beginner's Guide, Fifth Edition: A Beginner's Guide, Fifth Edition: CourseLoad ebook for HTML A BEGINNERS GD 5E, Wendy Willard.

Reference Books:

1. JavaScript for Absolute Beginners (Expert's Voice in Web Development) Paperback, by Terry McNavage (Author)
2. Learn JavaScript Quickly: A Complete Beginner's Guide to Learning JavaScript, Even If You're New to Programming by Code Quickly.

Online Resources/E-Learning Resources

1. <https://www.w3schools.com/html/>
2. <https://www.tutorialspoint.com/html5/index.htm>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Discrete Mathematics		Course Code and Course Type		U26BSCS103/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	-	3	3	40	60	-
Prerequisite:							
Course Objectives (CO):				The objectives of Discrete Mathematics are: 1. To introduce fundamental concepts of mathematical logic, sets, relations, and functions relevant to computer science. 2. To develop analytical and logical reasoning skills for solving computational problems. 3. To provide knowledge of sequences, summations, and discrete structures used in algorithm design. 4. To familiarize students with algebraic systems and group theory concepts for abstract problem solving. 5. To introduce graph theory and trees for modeling and solving real-world computing problems.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Apply logical reasoning to analyze propositions, construct truth tables, and solve problems using logical equivalences and normal forms. 2. Analyze binary relations, determine their properties, and apply concepts such as equivalence relations, partial orders, and lattices in problem-solving. 3. Apply set theory, functions, and sequences to solve mathematical and computational problems, including inclusion-exclusion and function composition 4. Apply algebraic structures such as semigroups, monoids, and groups, including subgroups and cosets. 5. Apply graph theory concepts to solve problems.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I		
Mathematical Logic: Propositions (Statements) Logical connectives, NOT $\neg$, AND $\wedge$, OR $\vee$, $\rightarrow$, $\leftrightarrow$ Compound statements form, truth tables, tautology, implications and equivalence of statements forms logical identities Normal forms : disjunctive normal form and simplification. Conjunctive normal form, PDNF, PCNF, logical implications,	CLO 1	9
UNIT II		

Relation: Relation defined as ordered n-tuple Unary , binary , ternary , n-ary Restrict to binary relations Complement of a relation , converse relation , compositions , matrix representation and its properties Graphical representation of relation – Digraphs Properties of binary relation – reflexive , irreflexive , symmetric , asymmetric , transitive equivalence , equivalence classes , partitions covering , compatible relation maximal compatibility block , transitive closure – Warshall's algorithm. Partial ordering relation – Hasse diagram, Chains and antichains. Lattice , maximal and minimal elements , upper bound , lower bound .	CLO 2	9
UNIT III		
Sets, Functions, Sequences and Summations: Sets: Set Operations, Computer Representation of Sets, Countable and Uncountable Set, Principle of Inclusion and Exclusion, Multisets; Functions: One-to-one and Onto Functions, Inverse Functions and Compositions of Functions, Graphs of Functions Sequences and Summations: Sequences, Special Integer Sequences, Summations	CLO3	9
UNIT IV		
Algebraic Systems: Unary , binary , ternary definitions of algebraic systems (restrict to binary operations) Properties – closure, idempotent , associative, commutative, identity , inverse, Semigroup , subsemigroup Monoid , submonoid group , abelian group , permutation group, multiplicative abelian group, cyclic group Subgroups : Cosets , right cosets , left cosets , normal subgroups , quotient groups.	CLO4	9
UNIT V		
Graph theory : trees Basic terminology , simple and weighted graph , adjacency and incidence , handshaking lemma , underlying graph of a digraph , complete graph , regular graph , bipartite graph , complete bipartite Isomorphism, complement of graph , connected graphs , paths-simple , elementary , circuit – simple , elementary Edge connectivity , vertex connectivity Eulerian path and eulerian circuit , planar graph – regions Euler's formula	CLO5	9
Total Hours		45

Learning resources

Textbooks:

1. Discrete Mathematical Structures for Computer Science by Kolman B and Bushy
2. Discrete Mathematical Structures with applications to Computer Science by Tremblay and Manohar

Reference Books:

1. Discrete Mathematics by C L Liu
2. Discrete Mathematics by Rosen

Online Resources and E-Learning Resources

1. <https://jeenotes.in/mathematics/sets-relations-functions/>
2. <https://www.coursera.org/specializations/discrete-mathematics>
3. <https://www.geeksforgeeks.org/engineering-mathematics/discrete-mathematics-tutorial/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Fundamentals of Computer Architecture		Course Code/ Course Type		U26BSCS104/DSCE	
Course Pattern		2026		Version		2.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hrs.	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	
Prerequisite: Basic Knowledge of Computers.							
Course Objectives (CO):				The objectives of Computer Architecture are: 1. To understand the fundamentals of computer systems and architecture. 2. To learn data representation, logic gates, memory, and processor organization. 3. To develop understanding of instruction execution and memory management. 4. To Explore modern trends and emerging technologies in computer architecture..			
Course Learning Outcomes (CLO):				Students would be able to: 1. Explain the fundamentals, components, and organization of computer systems. 2. Apply number systems and Boolean logic concepts to solve computing problems.. 3. Describe memory organization and storage mechanisms in computer systems. 4. Explain processor organization and instruction execution processes. 5. Identify I/O mechanisms and emerging trends in computer architecture.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Fundamentals of Computer Systems: Introduction to Computer Systems, Characteristics and Applications of Computers ,Types of Computers ,Generations of Computers , Functional Units of a Computer , Hardware and Software Concepts,Computer Organization vs Computer Architecture, Basic Block Diagram of Computer System, Overview of System Bus and Data Flow	CLO1	9
UNIT II		
Data Representation and Boolean Logic: Data Representation and Information Coding, Number Systems: Binary, Decimal, Octal, Hexadecimal, Number System Conversion, Binary Arithmetic Operations ,1's and 2's Complement,Character Encoding: ASCII and Unicode, Introduction to Logic Gates,Boolean Algebra Basics,De Morgan's Theorem and Simplification	CLO2	9
UNIT III		
Memory Organization and Storage Devices: Memory Hierarchy,Primary Memory: RAM, ROM, Cache Memory Secondary Storage Devices,Registers and Register Organization, Bus Structure and Data Transfer ,Cache Memory Concepts,Virtual Memory Basics,Memory Units and Access Methods,Storage Performance Parameters	CLO3	9
UNIT IV		
Processor Organization and Instruction Execution: CPU Structure and Functions, Arithmetic Logic	CLO4	9

Unit (ALU), Control Unit Basics, Machine Language and Assembly Language, Instruction Cycle, Types of Instructions , Basic Addressing Modes , Interrupts and Their Types , Introduction to Microprocessors		
UNIT V		
Input/Output Organization and Emerging Trends: Input and Output Devices, I/O Interface Concepts, Modes of Data Transfer ,Interrupt Driven I/O ,Direct Memory Access (DMA) Basics ,Introduction to Parallel Processing,Multicore Processors ,Cloud Computing Basics ,Recent Trends in Computer Architecture	CLO5	9
Total		45

Learning resources

Textbooks:

1. Computer Organization and Architecture, William Stallings, Pearson Education
2. Computer System Architecture, M. Morris Mano, Pearson Education
3. Structured Computer Organization, Andrew S. Tanenbaum. Pearson Education

Reference Books:

1. Computer Fundamentals and Architecture, P. K. Sinha, BPB Publications
2. Digital Logic and Computer Design, M. Morris Mano, Pearson Education
3. Fundamentals of Computer, V. Rajaraman, PHI Learning Pvt. Ltd.

Online Resources/E-Learning Resources:

1. <https://www.coursera.org/courses?query=computer%20architecture>
2. <https://nptel.ac.in/courses/106102157>
3. <https://nptel.ac.in/courses/106105163>

Name of the Program:		B.Sc. Computer Science (Cyber Security)			Semester: I		Level: UG	
Course Name		Computer Organization And Security Basics			Course Code and Course Type		U26BSCS105/DSCE	
Course Pattern		2026			Version		1.0	
Teaching Scheme					Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral	
3	-	-	3	3	40	60	-	
Prerequisite:								
Course Objectives (CO):					The objectives are: 1. Understand the basic architecture and organization of computer systems. 2. Explain computer hardware components and memory organization. 3. Understand processor operations and input-output concepts. 4. Recognize security threats, vulnerabilities, and risks in computer systems. 5. Understand security principles and safe computing practices.			
Course Learning Outcomes (CLO):					Students will be able to: 1. Explain computer organization and architecture fundamentals. 2. Understand memory hierarchy and processor functioning. 3. Identify input-output systems and operating system basics. 4. Recognize cyber security threats, vulnerabilities, and attacks. 5. Apply security principles and protection mechanisms for computing systems.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I		
Introduction to Computer Organization: Introduction to Computer Organization and Architecture, Evolution of Computer Systems, Basic Functional Units of a Computer, Von Neumann Architecture, Components of Computer System - CPU, Memory, Input Unit, Output Unit, Hardware and Software Relationship, Data Representation Basics, Number Systems - Binary, Decimal, Octal, Hexadecimal, Computer Generations, Applications of	CLO 1	9

Computer Systems		
UNIT II		
Memory Organization and Processor Basics: Memory Organization Concepts, Types of Memory - RAM, ROM, Cache Memory, Primary and Secondary Storage, Memory Hierarchy, Registers and Processor Components, Arithmetic Logic Unit (ALU), Control Unit, Instruction Cycle - Fetch, Decode, Execute Cycle, Introduction to Microprocessors, CPU Performance Basics	CLO 2	9
UNIT III		
Input-Output Organization and Operating System Basics: Input and Output Devices, Input-Output Organization, Device Controllers, Interrupts and DMA Basics, Storage Devices Overview - Hard Disk, SSD, USB Storage, Operating System Basics, Functions of Operating System, Process and Memory Management, File Management Concepts, User Interface Basics, System Performance Concepts	CLO3	9
UNIT IV		
Fundamentals of Security Basics: Introduction to Cyber Security, Importance of Security in Computing Systems, Security Goals, CIA Triad - Confidentiality, Integrity, Availability, Types of Security Threats, Vulnerabilities in Computer Systems, Risk Concepts, Security Policies, Types of Cyber Attacks, Malware Basics - Viruses, Worms, Trojan Horse, Spyware, Ransomware, Social Engineering Concepts, Phishing Attacks	CLO4	9
UNIT V		
Security Mechanisms and Safe Computing Practices : Authentication and Authorization, Password Security, Multi-Factor Authentication, Access Control Basics, Data Protection Concepts, Encryption Basics, Secure File Handling, Antivirus and Firewall Basics, Backup and Recovery Concepts, Safe Internet Usage, Security Awareness, Digital Footprint and Privacy, Secure Computing Best Practices, Emerging Trends in Cyber Security	CLO5	9
Total Hours		45

Learning resources

Textbooks:

1. M. Morris Mano — *Computer System Architecture*
2. Carl Hamacher — *Computer Organization*
3. William Stallings — *Computer Organization and Architecture*
4. Charles P. Pfleeger — *Security in Computing*
5. Michael E. Whitman and Herbert J. Mattord — *Principles of Information Security*

Reference Books:

1. Andrew Tanenbaum — *Structured Computer Organization*
2. Behrouz Forouzan — *Data Communications and Networking*
3. Nina Godbole — *Information Systems Security*
4. William Stallings — *Cryptography and Network Security*
5. Michael Goodrich — *Introduction to Computer Security*

Online Resources

6. <https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/>
7. <https://www.geeksforgeeks.org/cyber-security-tutorial/>
8. <https://ocw.mit.edu/courses/6-823-computer-system-architecture-fall-2005/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: II		UG	
Course Name		Software Engineering		Course Code/Course Type		U26BSCS106/SEC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA(Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	-	-	2	2	20	30	-
Prerequisite: ER Modeling							
Course Objectives (CO):				The objectives of Operating Systems Fundamentals are: 1. To learn and understand the principles of System Engineering. 2. To learn and understand the principles of Software Engineering. 3. To gain the knowledge of Software Development Life Cycle and methodology. 4. To impart various software requirement techniques. 5. To demonstrate the different system analysis and design engineering.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Compare and contrast various Software Engineering models. 2. Decide on an appropriate process model for developing a software project. 3. Classify software applications and Identify unique features of various domains. 4. Prepare System Requirement Specification (SRS) for the given problem. 5. Design and analyze Data Flow diagrams.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to System Engineering: Definition, Basic Components, Elements of the system, System Components, Types of System.	CLO 1	6
UNIT II		
Introduction to Software Engineering: Definition of Software, Characteristics of Software, Software Application Domain, Definition of Software Engineering, Need for software Engineering, Mc Call's Quality factors, The Software Process, Software Engineering Practice.	CLO 2	6
UNIT III		
Software Development Life Cycle (SDLC) and Methodologies: Introduction, Activities of SDLC, A Generic Process Model, Prescriptive Process models- Waterfall Model, Incremental Process Models, Evolutionary process Models (Prototyping and Spiral Model), Concurrent Models, Types	CLO3	6
UNIT IV		
Requirement Engineering: Introduction, Requirement Engineering Tasks, Establishing Groundwork for understanding of Software Requirement, Requirement Gathering, Feasibility study, Fact Finding Techniques.	CLO4	6
UNIT V		
Analysis and Design Engineering: Decision Tree and Decision Table, Data Flow Diagrams (DFD), Data Dictionary, Elements of DD, Advantages of DD, Input and Output Design, Entity Relationship Diagram (ERD), Case Studies on above topics.	CLO5	6
Total Hours		30

Learning resources

Textbooks:

1. Rajib Mall, “Fundamentals of Software Engineering”, PHI 2018, 5th Edition.

Reference Books:

1. Roger S. Pressman, “Software Engineering - A Practitioner’s Approach”, McGraw Hill 2010, 7th Edition.
2. Pankaj Jalote, “An Integrated Approach to Software Engineering”, Narosa Publishing House 2011, 3rd Edition.

Online Resources/E-Learning Resources

1. <https://www.javatpoint.com/software-engineering>
2. <https://www.scaler.com/topics/software-engineering/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Applied Communication		Course Code/ Course Type		U26BSCS107/AEC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	-	2	50	-	-
Prerequisite: Anyone can take this course with basic knowledge of English communication.							
Course Objectives (CO):				The objectives of Applied Communication are: 1. To comprehend the basic English communication components. 2. To Identify the Factors influencing interpersonal communication. 3. To Apply the knowledge of written communication. 4. To Demonstrate English communication in public speaking and presentation. 5. To develop students' understanding of digital communication tools, media literacy skills, and ethical considerations in online communication.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Define communication and explain its significance in personal, professional, and societal contexts. 2. Apply interpersonal communication skills in various contexts, such as social interactions, group discussions, teamwork, leadership, and professional settings. 3. Understand the fundamental principles of effective writing, including clarity, coherence, conciseness, and correctness. 4. Reflect on their presentation experiences, seek feedback from peers. 5. Use digital tools for collaboration, communication, and productivity, including project management platforms.			

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
Introduction to Communication: Definition and models of communication, Importance of effective communication in personal and professional contexts, Basic elements of communication: sender, receiver, message, channel, feedback, Communication barriers and strategies for overcoming them, Verbal and nonverbal communication skills.	CLO 1	6
UNIT II		

Interpersonal Communication: Understanding interpersonal relationships, Factors influencing interpersonal communication: culture, gender, perception, and self-concept, Effective listening skills and techniques, Assertiveness and conflict resolution strategies, Building and maintaining healthy, relationships	CLO 2	6
UNIT III		
Written Communication: Principles of effective writing, clarity, coherence, conciseness and correctness, Types of written communication, emails, memos, letters, reports and resumes, Planning and organizing written documents, Grammar, punctuation and style conventions, Proofreading and editing techniques	CLO3	6
UNIT IV		
Public Speaking and Presentation Skills: Understanding the importance of public speaking, Preparing and organizing a presentation, topic selection, audience analysis and speech outline, Delivery techniques, voice modulation, body language, and eye contact, Overcoming stage fright and anxiety, Handling questions and feedback from the audience	CLO4	6
UNIT V		
Digital Communication and Media Literacy: Overview of digital communication tools, email, social media, instant messaging and video conferencing, Netiquette, and online professionalism, Understanding media messages and sources	CLO5	6
Total Hours		30 Hours

Learning resources

Textbooks:

1. **"Communication in Everyday Life: A Social Interpretation"** by Steve Duck and David T. McMahan
2. **"Applied Communication in the 21st Century"** by Carole L. Huston and Ronald B. Adler

Reference Books:

1. "The SAGE Handbook of Communication and Instruction" edited by Deanna L. Fassett and John T. Warren
2. "Communication: Principles for a Lifetime" by Steven A. Beebe, Susan J. Beebe, and Diana K. Ivy

Online Resources/E-Learning Resources

1. <https://www.udemy.com/topic/communication-skills/free/>
2. <https://www.uou.ac.in/sites/default/files/slm/BHMAECC-II.pdf>

Name of the Program	B.Tech / BBA / BCA / BSc / BPharm	Semester: 01	Level: UG / PG
Course name	Basic German Language skill	Course Code / Course Type	
Course Pattern		Version	1.0
Prerequisite: Desire to get acquainted with the German Language.			
Course Objectives (CO):	The objectives of Basic German language skill are: 1. Identify and correctly pronounce German alphabets, numbers, and basic expressions used in everyday communication. 2. Use common greetings, introductions, and simple conversational phrases in formal and informal contexts. 3. Construct basic sentences using personal pronouns and regular verb conjugations in the present tense. 4. Apply fundamental grammar concepts such as articles (definite/indefinite), singular–plural forms, and basic sentence structure. 5. Demonstrate the ability to ask and answer yes/no and WH-questions in simple conversations.		
Course Learning Objectives (CLO):	After learning the course, the students will be able to: 1. correct pronunciation of German alphabets, numbers, and basic greetings in simple interactions. 2. Introduce oneself and others using basic sentence structures and personal pronouns. 3. Describe hobbies, professions, days, months, and seasons using relevant vocabulary and simple sentences. 4. Form and respond to yes/no and WH-questions using correct articles and sentence structures. 5. Ask for and give directions, describe places, and use transport-related vocabulary effectively.		

Topic / Description	CLO	Hours
Unit 01		
Lektion 1: Guten Tag 1. Alphabets, pronunciation keys 2. Numbers 0-20 3. Numbers 20-100 4. Greetings, Bidding bye 5. How are you doing? Formal and informal	1	6
Unit 02		
Lektion 1: Guten Tag 1. Countries and languages	2	6

2. Verb structure 3. Personal pronouns 4. Verb Conjugation for regular verbs 5. Basic sentence formation 6. Self-introduction		
Unit 03		
Lektion 2 Freunde, kollegen und ich 1. Hobbies 2. Weekdays, Months 3. Season 4. Professions 5. Regular and irregular verbs	3	6
Unit 04		
Lektion 2 Freunde, kollegen und ich 1. Definite Articles- der, die, das 2. Singular and plural forms 3. Yes/ no questions 4. Wh questions	4	6
Unit 05		
Lektion 3: In Hamburg 1. To know and learn names of different buildings and places 2. Learn to ask and guide the directions 3. Mode of transport 4. Imperativ form in 'Sie' 5. Negative Articles- kein, keine 6. Indefinite Articles- ein, eine	5	6
Total Hours		30

Name of the Program:	B.Tech/B.B. A/B.C. A/B.Sc/B.Pharm	Semester: 1	Level: UG/PG
Course Name	Basic Japanese Language skill	Course Code/Course	
Course Pattern		Version	1.0

Pre-Requisite: Desire to get acquainted with the Japanese language.

Course Objectives (CO):	The objectives of Basic Japanese language skill are: 1. To meet the needs of ever-growing industry, with respect to language support. 2. To get introduced to Japanese society and culture through language. 3. To acquire competitive edge in career choices. 4. To participate effectively & responsibly in a multicultural world. 5. To enable learners to communicate effectively in Japanese language.
Course Learning Outcomes (CLO):	After learning the course, the students will be able to: 1. Read and Write Hiragana script. 2. Write and speak basic sentences. 3. Comprehend and speak about time, hobbies, likes and dislikes. 4. Write basic kanji. 5. Use the Hiragana script in discussion.

Introduction to Japanese Language 1. Introduction of Japanese culture, History,History of script 2. Speaking Self-introduction 3. Daily Greetings& Expressions 4. Numbers-1-20 5. Classroom Instructions	CLO 1	6
UNIT II		
Introduction of Hiragana Script 1. Days of the week 2. Months, Days of the month 3. Colors, Age 4. Short video skit on self-introduction 5. Start with Hiragana script Series 1-3	CLO 2	6
UNIT III		
Introduction of Hiragana Script 1.2 1. Hiragana script Series 4-6 2. Hiragana script Series 7-10 3. Writing Practice – Basic words 4. Hiragana Modified sounds 5. Hiragana Contracted sounds	CLO 3	6
UNIT IV		
Time and verbs 1. Speaking: Talking about routine 2. Reading: A clock 3. Writing: routine using verbs and time 4. Writing words using Hiragana Series, self-introduction in Hiragana script.	CLO 4	6
UNIT V		
Introduction of Katakana and basic kanji 1. Reading: English words, country names 2. Starting with Katakana series 3. Writing: Basic number Kanji 4. short video skit on self-introduction	CLO 5	6
Total		30

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Concepts and Application in Science (IKS)		Course Code/ Course Type		U26BSCS108/IKS	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hrs.	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
2	-	-	2	2	50	-	-
Prerequisite: Basic knowledge of science.							
Course Objectives (CO):				The objectives of Concepts and Application in Science are: 1. To remember Indian Knowledge Systems: Origin, Evolution and Ontological Approach 2. To understand Indian Knowledge Approaches. 3. To apply Sciences of Life and Mind. 4. To examine Indian Knowledge System Torchbearers – Ancient and Modern 5. To analyse Self-Knowledge for Personal Effectiveness.			
Course Learning Outcomes (CLO):				Students would be to: 1. Identify and appreciate the rich heritage that resides in our traditions. 2. Explain the mind/voice dynamic in Indian knowledge systems. 3. Explain the practices that will prepare one for the inner-journey to discover the Self. 4. Analyse the need and importance of Sanskrit in getting to the roots of the philosophical concepts. 5. Analyse the various functions in Indian knowledge systems.			

Descriptors/Topics	CLO	Hours
UNIT I		
Indian Knowledge System and Vedic Corpus: Introduction to IKS, Need for IKS, Historicity of IKS, Salient aspects of IKS, IKS in ancient India and in modern India. Introduction to Vedas, Four Vedas, Sub-classification of Vedas, Messages in Vedas, Basics of Nirukta and Chandas.	CLO1	6
UNIT II		
Wisdom through the Ages: Puranas, Ithihasas, Nitishastras, Subhasitas, Linguistics, Components of a language, Paṇini's work on Sanskrit grammar, Phonetics in Sanskrit, Role of Sanskrit in natural language processing, Framework for establishing valid knowledge.	CLO2	6
UNIT III		
Number Systems and Units of Measurement: Salient features of the Indian numeral system, Importance of decimal representation, The discovery of zero and its importance, Unique approaches to represent numbers, Unique aspects of Indian Mathematics, Great mathematicians and their significant contributions in the area of arithmetic, algebra, geometry, trigonometry, combinatorial problems in Chandah-sastra of Pingala	CLO3	6
UNIT IV		
Knowledge Framework and classifications: Indian scheme of knowledge, The knowledge triangle, Prameya, A vaiśeṣikan approach to physical reality, Dravyas, The constituents of the physical reality	CLO4	6
UNIT V		

Science and Technology in the Vedic Age and Post-Vedic Records. Knowledge: Framework and Classification, Astronomy Encryption Method used in ancient India, Introduction to YantraShastra, VaimanikShashtra, Agriculture Technologies	CLO5	6
Total hours		30

Reference Books

1. Indian Knowledge System – B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R.N.
2. Introduction to Indian Knowledge System – Kapil Kapoor & Avadhesh Kumar Singh
3. The Wonder That Was India – A. L. Basham

Textbooks

1. Indian Knowledge Systems
2. Knowledge Traditions and Practices of India
3. Foundations of Indian Heritage

Online Resources

<https://nptel.ac.in/courses/109106188>

<https://iks.aicte-india.org/>

<https://swayam.gov.in/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		UHV-I: Professional Ethics		Course Code/ Course Type		UHV	
Course Pattern		2026		Version		2.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/ Oral
2	0	0	0	2	50	-	-
Pre-Requisite: UHV-I							
				The objectives of Universal Human Value- Professional Ethics are: 1. To make the students understand the importance of ethical behaviour. 2. To expose the students to the ethical practices to be followed in profession. 3. To sensitize the students to become responsible persons who will uphold ethics in profession when they pursue their career. 4. To make students understand Psychological and Philosophical approaches. 5. To make students understand social responsibility and corporate Sustainability			
Course Learning Outcomes (CLO):				Students would be able to: 1. Equip themselves with an understanding of moral, professional and personal values. 2. Understand the need of ethics in shaping their profession The learners will hone their decision-making skills. 3. Refine their business ethics based on psychological and philosophical perspective. 4. Assess the need for a balance between ecology, and economy. 5. Equip themselves with a better understanding of themselves and the society they live in and the responsibilities they shoulder in creating a sustainable world.			

Descriptors/Topics	CLO	Hours
UNIT I		
Individual and Professional Ethics: Introduction to Professional Ethics, Morals, Values and Ethics – Personal and Professional- Sense of Professional Ethics – Code of Ethics by NSPE- Making decisions with ethical dimensions–definition–roadmap to ethical decision making– common standards– internal obstacles – bias – empathy	CLO 1	6
UNIT II		
Business Ethics: Philosophical approaches to Business Ethics – ethical reasoning – ethical issues in business - Social Responsibility of Business- conflict of interest–cultural relativism- Ethical Leadership-Resisting un-ethical authority and domination-Global Business Ethics	CLO 2	6
UNIT III		

Psychological Approaches: Ethical Theories-Psychological and Philosophical Approaches-Myths about Morality-conflict of interest in psychological perspective - Courage-Integrity – ethical dilemma – Emotional Intelligence (Mahabharata- Iskcon Publications)	CLO 3	6
UNIT IV		
Workplace Ethics: Ethics in changing domains of Research, academic integrity, intellectual honesty-Role of Engineers and Managers, Ethical issues in Diverse workplace, competition, free will- Confidentiality, employee rights – Intellectual property rights – discrimination	CLO 4	6
UNIT V		
Safety, Responsibilities and Rights: Ecology, and Economy-Risk benefit analysis and reducing risk SDGs–Corporate social responsibility and Corporate Sustainability - CSR in India - Sustainability Case Studies	CLO 5	6
Total Hours		30

Learning resources

Textbooks:

1. Subramanian. R. Professional Ethics, Oxford Publication,2013.
2. Nagarasan. R. S. Professional Ethics and Human Values. New Age International Publications, 2006.

Reference Book:

Mike W Martin and Roland Schinzinger, Ethics in Engineering,4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi,2014

Online Resources/E-Learning Resources

1. <https://www.nspe.org/resources/ethics/code-ethics>
2. <https://www.toolshero.com/tag/ethical-decision-making/>
3. <https://pagecentertraining.psu.edu/public-relations-ethics/introduction-to-public-relations-ethics/lesson-1/ethical-theories/>
4. <https://peer.asee.org/case-studies-in-engineering-ethics.pdf>

CIA Guidelines

Online Quiz (Based on MCQ)- 20 marks

Activity (with short Report Submission) - 20 Marks

Academic Sincerity - 10 marks

Few of the suggested activities are Assignments, Debates, Poster presentations, Model making, Group presentation, Field visits and Group Discussions.

Debate Topics

- Ethical Approach versus Realistic Approach
- Individual and Social Approach
- Dilemma between heart and Mind

Activity

- Analyze the wastage (Electricity or any other) at work place? How you managed.

Assignment

- Analyze the code of ethics at work place.
- If you fulfil the duties, rights will automatically fall in place. Justify the statement

References:

1. <https://uhv.org.in/>
2. <https://vvce.ac.in/wp-content/uploads/2021/04/Realising-Aspirations-of-NEP2020-UHV.pdf>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: I		Level: UG	
Course Name		Cyber Security in IOT		Course Code and Course Type		U26BSCS109/MOOC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	-	3	3	40	60	-
Prerequisite:							
Course Objectives (CO):				1. Understand the fundamentals and architecture of IoT systems. 2. Identify IoT components, smart devices, and communication technologies used in IoT ecosystems. 3. Explain IoT networking concepts, communication models, and protocols. 4. Recognize security threats, vulnerabilities, and risks in IoT environments. 5. Understand security mechanisms, best practices, and mitigation techniques for protecting IoT systems.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Explain IoT concepts, architecture, and applications. 2. Identify IoT communication models and networking protocols. 3. Understand IoT ecosystem components including sensors, gateways, and cloud platforms. 4. Recognize cyber threats, vulnerabilities, and attacks targeting IoT devices. 5. Apply basic IoT security practices and recommend protection techniques.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I		
Introduction to Internet of Things (IoT): Introduction to Internet of Things, Evolution and History of IoT, Characteristics of IoT, Difference between Internet and IoT, IoT Ecosystem Overview, Smart Devices and Connected Systems, Sensors and Actuators (Conceptual Overview), IoT Architecture Basics, Machine-to-Machine (M2M) Communication, IoT Applications, Smart Homes, Healthcare, Smart Cities, Agriculture, Industrial Automation	CLO 1	9
UNIT II		
IoT Communication and Networking Basics: IoT Communication Concepts, Embedded Systems Overview, Wireless Communication Technologies, Wi-Fi, Bluetooth, Zigbee, RFID, NFC, IoT Networking Basics, IPv6 Concept in IoT, Gateways and Cloud Connectivity, IoT Communication Models, Data Flow in IoT Systems, Device-to-Device Communication, Device-to-Cloud Communication, Introduction to IoT Protocols, MQTT, CoAP, HTTP/HTTPS, Learning Focus: Students understand networking and communication technologies without requiring hardware implementation.	CLO 2	9

UNIT III		
Introduction to Cyber Security in IoT Introduction to Cyber Security, Need for Security in IoT, Security Challenges in IoT, CIA Triad in IoT, Confidentiality, Integrity, Availability, IoT Attack Surface, Risks in Connected Devices, Data Privacy Issues in IoT, Security Requirements of IoT Systems, Importance of Secure IoT Design	CLO3	9
UNIT IV		
Threats, Vulnerabilities and Attacks in IoT: IoT Vulnerabilities - Weak Authentication, Default Passwords and Insecure Configurations, Firmware Vulnerabilities, Network-Level Vulnerabilities, Common IoT Attacks - Malware Attacks, Botnets, DoS and DDoS Attacks, Spoofing Attacks, Man-in-the-Middle Attack, Eavesdropping, Replay Attack, Mirai Botnet Case Study, IoT Privacy Threats, Real-World IoT Security Incidents	CLO4	9
UNIT V		
Security Mechanisms and Best Practices in IoT: Authentication and Authorization, Access Control Concepts, Encryption Basics, Secure Communication in IoT, Device Identity Management, Firmware Updates and Patch Management, Secure Boot Concept, Network Security Fundamentals, Firewalls and Intrusion Detection Basics, IoT Security Standards Overview, Best Practices for Secure IoT Deployment, Future Trends in IoT Security - AI in IoT Security, Blockchain in IoT Security	CLO5	9
Total Hours		45

Learning resources

Textbooks:

1. Arshdeep Bahga and Vijay Madisetti — *Internet of Things: A Hands-On Approach*
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete — *IoT Fundamentals*
3. Jean-Philippe Aumasson — *Serious Cryptography*
4. Dieter Uckelmann — *Architecting the Internet of Things*
5. Brian Russell and Drew Van Duren — *Practical Internet of Things Security*

Reference Books:

1. Adrian McEwen and Hakim Cassimally — *Designing the Internet of Things*
2. Fei Hu — *Security and Privacy in Internet of Things (IoTs)*
3. Perry Lea — *Internet of Things for Architects*
4. Shancang Li and Li Da Xu — *Securing the Internet of Things*
5. Jan Holler — *From Machine-to-Machine to the Internet of Things*

Online Resources and E-Learning Resources

<https://nptel.ac.in/courses/106105166>

<https://nptel.ac.in/courses/106105214>

<https://www.netacad.com/courses/iot/introduction-iot>

<https://www.netacad.com/courses/networking/networking-basics>

<https://owasp.org/www-project-internet-of-things/>

<https://www.cisa.gov/internet-things>

<https://ocw.mit.edu/search/?q=cyber+security>

B.Sc. Computer Science (Cyber Security)
2026 PATTERN
COURSE DETAILS
Semester - II

Name of the Program:	B.Sc. Computer Science (Cyber Security)	Semester: II	Level: UG
Course Name	Advanced Programming Fundamentals using C	Course Code and Course Type	U26BSCS201/DSC
Course Pattern	2026	Version	1.0
Teaching Scheme			
Theory	Practical	Tutorial	Total Credits
Hours	CIA(Continuo us Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	-	3
3	40	60	-
Prerequisite:			
Course Objectives (CO):		The objectives of: 1. Apply advanced function concepts, storage classes, and modular programming techniques to develop structured C programs. 2. Use pointers, dynamic memory allocation, and memory management concepts for efficient problem solving in C. 3. Develop programs using structures, unions, enumerations, and user-defined data organization techniques. 4. Implement file handling operations and command-line arguments for data processing applications in C programming. 5. Apply advanced string handling, preprocessor directives, debugging, and optimization techniques using GCC compiler in a Linux-based programming environment.	
Course Learning Outcomes (CLO):		Students will be able to: 1. Develop modular C programs using advanced functions, recursion, storage classes, and reusable code structures. 2. Apply pointers, pointer arithmetic, and dynamic memory allocation techniques for efficient program execution. 3. Design programs using structures, unions, enumerations, and user-defined data types for complex data handling. 4. Implement file processing and command-line argument techniques for persistent data storage and program execution. 5. Develop optimized C programs using string manipulation, macros, preprocessing directives, and debugging practices in Linux-based GCC environment.	

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I:		
Advanced Functions and Storage Classes: Function review and modular programming, Call by value and call by reference - parameter passing techniques, Recursive functions - nested recursion, Scope and lifetime of variables, Storage classes - auto, static, register, extern, Header files - user-defined header creation, Function prototypes and reusable code, Modular programming concepts - multiple file handling, Program organization techniques	CLO 1	9
UNIT II:		
Pointers and Dynamic Memory Allocation: Introduction to pointers, Pointer declaration and initialization, Pointer arithmetic - increment, decrement, Pointer with arrays - array traversal, Pointer	CLO 2	9

with functions - parameter passing, Double pointers - pointer to pointer, Dynamic memory allocation - malloc(), calloc(), realloc(), free(), Memory allocation errors - dangling pointers, NULL pointers, Dynamic memory-based programs		
UNIT III:		
Structures, Unions, and Enumerations: Structure declaration and initialization, Accessing structure members - dot operator, Arrays of structures, Nested structures, Structures with functions - passing structure to function, Self-referential structures, Union declaration and memory sharing, Difference between structure and union, Enumeration data types - symbolic constants, Applications of structures and unions	CLO3	9
UNIT IV:		
File Handling and Command Line Arguments: File handling concepts, File operations - open, close, read, write, append, File modes - text and binary modes, File pointers and EOF handling, Reading and writing records, Sequential file processing, Command line arguments - argument passing, Error handling in file operations, Record management applications using files	CLO4	9
UNIT V:		
Advanced String Handling and Preprocessor Directives: Advanced string operations, String manipulation using pointers, String tokenization - parsing strings, Command-based string processing, Preprocessor directives - #define, #include, #ifdef, Macro functions - parameterized macros, Conditional compilation, Bitwise operators - AND, OR, XOR, shift operations, Program debugging and optimization techniques	CLO5	9
Total Hours		45

Textbooks

1. *Programming in ANSI C* – Programming in ANSI C
2. *Let Us C* – Let Us C
3. *Programming with C* – Programming with C
4. *C Programming: A Modern Approach* – C Programming: A Modern Approach
5. *The C Programming Language* – The C Programming Language

Reference Books

1. *Expert C Programming: Deep C Secrets* – Expert C Programming: Deep C Secrets
2. *Head First C* – Head First C
3. *Practical C Programming* – Practical C Programming
4. *C: How to Program* – C: How to Program
5. *C in a Nutshell* – C in a Nutshell

Online Resources

<https://www.w3schools.com/c/>
<https://www.programiz.com/c-programming>
<https://www.geeksforgeeks.org/c-programming-language/>
<https://www.tutorialspoint.com/cprogramming/index.htm>
<https://www.learn-c.org/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: II		Level: UG	
Course Name		Advanced Programming Fundamentals using C Lab		Course Codeand Course Type		U26BSCS211/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
-	2	-	2	4	25	-	25
Prerequisite:							
Course Objectives (CO):				The objectives are: 1. Introduce students to programming practice using C language in a Linux environment. 2. Develop problem-solving skills through hands-on coding. 3. Familiarize students with Linux terminal commands for compiling and executing C programs. 4. Build programming logic using control structures, arrays, strings, and functions. 5. Prepare students for advanced C programming laboratory work.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Write, compile, and execute C programs using GCC compiler in a Linux-based environment. 2. Develop structured C programs using variables, operators, and expressions. 3. Apply conditional and looping statements for problem-solving in C programming. 4. Develop programs using arrays, strings, and user-defined functions. 5. Debug, test, and improve program logic using standard C programming practices.			

Course Contents/Syllabus: Practical Plan

Activity Number	Assignment/ Practical/ Activity Title	Week Number/Turn	Details	CLO	Hours
1	Advanced Functions and Recursion	Week 1/ Turn 1 and 2	a. Write a recursive program for factorial. b. Generate Fibonacci series using recursion. c. Find GCD of two numbers using recursive function. d. Reverse a number using recursion.	CLO1	4
2	Call by Value and Call by Reference	Week 2/	a. Swap two numbers using call by value. b. Swap two numbers using call by reference. c. Compare outputs of both techniques.		

		Turn1and2	d. Pass array to function and display elements.	CLO1	4
3	Storage Classes in C	Week 3/ Turn1and2	a. Demonstrate auto storage class. b. Demonstrate static variable behavior. c. Use register variable in loop. d. Create example using extern variable.	CLO1	4
4	Pointer Basics and Arithmetic	Week 4/ Turn1and2	a. Declare and initialize pointers. b. Perform pointer arithmetic. c. Access array elements using pointers. d. Display memory addresses of variables.	CLO1	4
5	Pointers with Arrays and Strings	Week 5/ Turn 1 and 2	a. Traverse array using pointers. b. Reverse array using pointers. c. Find string length using pointers. d. Copy one string to another using pointers.	CLO2	4
6	Dynamic Memory Allocation	Week 6/ Turn 1 and 2	a. Allocate memory using malloc(). b. Allocate memory using calloc(). c. Resize memory using realloc(). d. Release memory using free().	CLO2	4
7	Pointer to Functions and Double Pointer	Week 7/ Turn 1 and 2	a. Implement pointer to function. b. Call function using function pointer. c. Demonstrate pointer to pointer. d. Modify value using double pointer.	CLO3	4
8	Structures in C	Week 8/ Turn 1 and 2	a. Create student structure. b. Read and display structure data. c. Array of structures for multiple records. d. Pass structure to function.	CLO3	4
9	Nested Structures and Self-Referential Structures	Week 9/ Turn 1 and 2	a. Create nested structure for employee details. b. Display nested structure values. c. Create self-referential structure example. d. Use structure pointers.	CLO3	4
10	Union and Enumeration	Week 10/ Turn 1 and 2	a. Create union for mixed data storage. b. Compare memory usage of structure and union. c. Use enumeration for weekdays. d. Display enum constants.	CLO4	4
11	File Handling Basics	Week 11/ Turn 1 and 2	a. Create file and write data. b. Read data from file. c. Append data to file. d. Count characters in file..	CLO4	4
12	File Handling with Records	Week 12/ Turn 1 and 2	a. Store student records in file. b. Read records from file. c. Search record using roll number. d. Update file record.	CLO5	4
13	Command Line Arguments	Week 13/ Turn 1 and 2	a. Accept values through command line. b. Perform arithmetic operations using arguments. c. Count number of arguments passed. d. Display argument list.	CLO5	4
14	Preprocessor Directives and Macros	Week 14/ Turn 1 and 2	a. Create macros using #define. b. Implement parameterized macro. c. Use conditional compilation. d. Create user-defined header file.	CLO5	4

15	Advanced String Handling and Bitwise Operations	Week 15/ Turn 1 and 2	a. Tokenize string using delimiters. b. Reverse string using pointers. c. Perform bitwise AND, OR, XOR. d. Demonstrate left shift and right shift operations.	CLO5	4
----	---	--------------------------	--	------	---

Learning resources

Textbooks

1. Programming in ANSI C – Beginner-friendly textbook covering C fundamentals, operators, arrays, and functions.
2. Let Us C – Widely used academic book with simple examples and practice programs.
3. Programming with C – Good for structured learning and laboratory-oriented exercises.
4. Programming in C – Practical introduction to C programming with examples.
5. C Programming: A Modern Approach – Strong conceptual coverage for foundational C learning.

Reference Books

1. The C Programming Language – Classic reference book written by the creators of C.
2. C in a Nutshell – Concise reference for syntax and standard libraries.
3. Practical C Programming – Useful for lab practice and coding techniques.
4. Head First C – Visual and activity-based learning for beginners.
5. C: How to Program – Detailed programming exercises and examples.

Online Resources

1. <https://www.w3schools.com/c/>
2. <https://www.programiz.com/c-programming>
3. <https://www.geeksforgeeks.org/c-programming-language/>
4. <https://www.learn-c.org/>
5. <https://www.tutorialspoint.com/cprogramming/index.htm>

COURSE CURRICULUM

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester :II		Level: UG	
Course Name		Database Management System		Course Code/ Course Type		U26BSCS202/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
3	-	-	3	3	40	60	-
Course Objectives (CO):					The objectives of Database Management System: - 1. Understand fundamental concepts, architecture, and components of database management systems. 2. Design databases using entity-relationship and relational models. 3. Apply relational algebra and SQL for data definition and manipulation. 4. Analyze database design using functional dependencies and normalization techniques. 5. Understand and evaluate transaction management, concurrency control, and basic database security concepts.		
Course Learning Outcomes (CLO):					Students would be able to: 1. Explain DBMS architecture, data models, and roles of database users. 2. Design ER models and convert them into relational schemas. 3. Apply SQL queries for data retrieval and manipulation. 4. Analyze functional dependencies and perform normalization up to 3NF. 5. Evaluate transaction processing, concurrency control, and basic database security issues.		

Course Contents/Syllabus:

Descriptors/Topics	CLO	Hours
UNIT I		
INTRODUCTION TO DATABASE MANAGEMENT SYSTEM: Introduction to Database Systems, Characteristics and Advantages of DBMS, Database Users and Database Administrator, DBMS Architecture and Data Independence, Data Models: Hierarchical, Network and Relational (Overview), Schema and Instances, Database Languages and Interfaces, Conceptual Database Design, Entity-Relationship Model, Entities, Attributes and Relationships, Strong and Weak Entity Sets, Generalization, Specialization and Aggregation, Introduction to Data Security Concepts in Databases.	CLO 1	9
UNIT II		
INTRODUCTION TO RELATIONAL MODEL: Relational Model Concepts, Relational Model Constraints, Mapping ER Model to Relational Model, Relational Algebra Operations, Introduction to SQL, Data Definition Language, Data Manipulation Language, Basic SQL Queries, Selection and Projection, Joins, Aggregate Functions, Group By And Having Clause, Views, Constraints and Indexes , Introduction To SQL Injection (Concept).	CLO 2	9
UNIT III		

DATABASE DESIGN AND NORMALIZATION: Relational Database Design Concept, Functional Dependencies, Normal Forms (1NF, 2NF, 3NF), Lossless Join and Dependency Preserving Decomposition, Introduction to Multivalued Dependency, Role of Normalization in Data Integrity and Security	CLO3	9
UNIT IV		
TRANSACTION MANAGEMENT: Transaction Concept and Transaction States, ACID Properties, Serializability, Schedules, Recoverability, Isolation Levels , Overview of Recovery Concepts, Role of Transactions in Maintaining Data Consistency and Preventing Data Anomalies.	CLO4	9
UNIT V		
CONCURRENCY CONTROL: Concurrency Control Concepts, Problems in Concurrent Transactions, Lock-Based Protocols, Two-Phase Locking (2PL), Basic Deadlock Concepts, Introduction to Database Security: Access Control Concepts, User Roles and Privileges, Overview of Data Protection Mechanisms in Databases.	CLO5	9
Total Hours		45

Learning resources

Textbooks:

1. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, McGraw Hill Education. (Units I, II, III, V)
2. Database System Concepts, Abraham Silberschatz, Henry F. Korth and S. Sudarshan, 6th Edition, McGraw Hill Education. (Units I, IV)

Reference Books:

1. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, Pearson Education.
2. Database Systems, Ramez Elmasri and Shamkant B. Navathe, 6th Edition, Pearson Education.
3. Database Systems: Design, Implementation, and Management, Peter Rob and Carlos Coronel, 7th Edition, Cengage Learning.

Online Resources

1. Scaler – DBMS tutorials and structured learning-<https://www.scaler.com/topics/course/dbms/>
2. GeeksforGeeks – DBMS concepts, examples, and practice- <https://www.geeksforgeeks.org/dbms/>

E-Learning Resources

1. Udemmy – Courses on database management systems- <https://www.udemy.com/topic/database-management/>
2. GitHub – DBMS learning repositories and examples- https://github.com/vinabi/e_learning-db

COURSE CURRICULUM

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester :II		Level: UG	
Course Name		Database Management System Lab		Course Code/ Course Type		U26BSCS212/DSC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical/Oral
-	2	-	1	2	25	-	25
Prerequisite: Basic Knowledge of Statistics.							
Course Objectives (CO):				The objectives of Database Management System: - 1. Understand fundamental SQL commands for database definition and manipulation. 2. Construct SQL queries using selection, projection, and expressions. 3. Apply filtering and conditional operations to retrieve relevant data. 4. Use advanced SQL features such as functions, joins, and subqueries. 5. Understand basic database management operations including views and indexing.			
Course Learning Outcomes (CLO):				Students would be able to: 1. Create and modify database tables using DDL commands. 2. Perform data manipulation operations using DML commands (insert, update, delete). 3. Write SQL queries using SELECT statements with expressions and operators. 4. Apply filtering techniques using WHERE clause and logical operators. 5. Implement joins, subqueries, views, and basic indexing operations.			

Course Contents/Syllabus: Practical Plan

Activity Number	Assignment/ Practical/ Activity Title	Week Number/ Turn	Details	CLO	Hours
1	Introduction to SQL and DDL Commands	Week 1 Turn 1 and 2	Components of SQL with Examples and Syntax. DDL Commands	CLO1	2
2	Data Manipulation Language (DML)	Week 2/ Turn 1 and 2	insert, update, delete operations	CLO1	2
3	Data Control Language (DCL) and Access Control	Week 3/ Turn 1 and 2	Grant and Revoke Commands, Role of Access Control in Database Security	CLO1, CLO2	2
4	Basic SELECT Queries	Week 4/ Turn 1 and 2	Basic Select Statements, Arithmetic Expressions, Simple Queries	CLO1, CLO2	2
5	Operators and	Week 5/	Operator, Precedence,	CLO2	2

	Expressions	Turn 1 and 2	Concatenation Operator, Literal Character Strings		
6	Filtering Data using WHERE Clause	Week 6/ Turn 1 and 2	Using the WHERE Clause Comparison Operators, Character and Date Conditions, Introduction to Unsafe Query Handling	CLO2, CLO3	2
7	Pattern Matching and NULL Handling	Week 7/	Using the LIKE Condition, Wildcard Characters, Using the NULL Conditions	CLO3	2
8	Logical Conditions	Week 8/ Turn 1 and 2	AND, OR, NOT operators	CLO3	2
9	SQL Functions	Week 9/ Turn 1 and 2	Basic Functions and Precedence Examples	CLO3	2
10	Single Row and Aggregate Functions	Week 10/ Turn 1 and 2	Single Row Functions, Aggregate Functions		2
11	Advanced Functions	Week 11/ Turn 1 and 2	Date Functions Conversion Functions	CLO4, CLO5	2
12	Joins and Multi-table Queries	Week 12/ Turn 1 and 2	Joins and their types	CLO5	2
13	Advanced Joins	Week 13/ Turn 1 and 2	Natural joins, SQL joins syntax	CLO5	2
14	Grouping and Subqueries	Week 14/ Turn 1 and 2	Group by, Having, Subqueries (single-row)	CLO5	2
15	Index And View	Week 15/ Turn 1 and 2	Create Views, Simple Index Creation and Deletion	CLO5	2
Total					30

Learning resources

Textbooks:

1. SQL QuickStart Guide, Walter Shields, ClydeBank Media.
2. SQL All-in-One For Dummies, Allen G. Taylor, Wiley

Reference Books:

1. Practical SQL: A Beginner's Guide to Storytelling with Data, Anthony DeBarros, No Starch Press.
2. Learning SQL, Alan Beaulieu, O'Reilly Media.

Online Resources

1. Scaler – DBMS tutorials and structured learning-<https://www.scaler.com/topics/course/dbms/>
2. GeeksforGeeks – DBMS concepts, examples, and practice- <https://www.geeksforgeeks.org/dbms/>

E-Learning Resources

1. W3Schools – SQL tutorials with examples- <https://www.w3schools.com/sql/>
2. LearnSQL.com – Structured SQL courses and exercises- <https://learnsql.com/>
3. SQLZoo – Practice-based SQL learning- <https://sqlzoo.net/>

Name of the Program	B.Tech / BBA / BCA / BSc / Bpharm	Semester: 02	Level: UG / PG
Course name	Basic German Language skill	Course Code / Course Type	
Course Pattern		Version	1.0
Teaching Scheme		Assessment Scheme	
Prerequisite: Desire to get acquainted with the German Language.			
Course Objectives (CO):	The objectives of Basic German language skill are: 1. Apply German vocabulary related to food, markets, family, health, and daily routines in communication. 2. Construct sentences using the accusative case and appropriate verb structures in practical contexts. 3. Demonstrate the use of time expressions, prepositions, and possessive articles in describing daily activities. 4. Use modal verbs and imperative forms effectively to express requests, permissions, and instructions. 5. Communicate confidently in real-life situations such as shopping, dining, scheduling appointments, and healthcare interactions.		
Course Learning Objectives (CLO):	After learning the course, the students will be able to: 1. Use food and market-related vocabulary to engage in basic conversations about meals, shopping, and currency. 2. Apply the accusative case and accusative verbs correctly in questions and statements. 3. Describe daily routines, family, and schedules using formal/informal time expressions, prepositions, and possessive articles. 4. Form and respond to questions using modal verbs and construct sentences expressing ability, necessity, and permission. 5. Communicate effectively in health-related situations using appropriate vocabulary, imperative forms, and conversational expressions.		

Assessment/ Examination Scheme:					
Continuous Assessment/Internal Assessment				End Term Examination	
40%				60%	
Continuous Assessment/Internal Assessment (40%)					
Class Tests / Quizzes	Assignments	Oral / Speaking (Sprechen)	Attendance & Participation	Listening Skills (Hören)	End Term Examination
					60%
10	10	05	10	5	40%

Topic / Description	CLO	Hours
Unit 01		
Lektion 4: Guten Appetit! - Food related vocabulary - To talk about food and beverages - Different types of Markets - Grocery and mealtimes - Currency of Germany	1	6
Unit 02		
Lektion 4: Guten Appetit! - Akkusative Case - Akkusative verbs - Wh questions and statements with akkusative verbs - Conversation related to food and drinks. - Conversation related to shopping	2	6
Unit 03		
Lektion 5: Tag für Tag - Formal Timings - Informal Timings - Family members - Prepositions- 'am', 'um', 'von...bis' - Possessive articles	3	6
Unit 04		
Lektion 5: Tag für Tag - Modal verbs concept - Modal verbs verb conjugation - Wh questions with modal verbs - Yes/no questions with modal verbs - Conversation- to book an appointment	4	6
Unit 05		

Lektion 8: Fit und Gesund 1. Vocabulary- Body parts, illness, medicines 2. Imperativ in du, Sie and ihr forms 3. Modal verbs 4. Conversation at hospital/ with doctor	5	6
Total Hours		30

Learning Resources:

Textbook:

- 1) Netzwerk neu A1 – Published by Goyal Publishers and Distributors(updated text book)

Reference Books:

- 1) Brücke 1- Maharashtra state board Bureau of Textbook production
- 2) Hilfe Vol. 1 and 2 (Publisher – Nirali Publications)
- 3) Collins Grammar book (Publisher – Goyal Publisher and Distributors)
- 4) Grammatik Aktiv A1 – B1 (Publisher – Goyal Publisher and Distributors)

Online Resources:

- 1) You tube Channel
 - a. Easy German – <https://www.youtube.com/channel/UCbxb2fqe9oNggIAoYqsYotQ>
 - b. Learn German with Anja – <https://www.youtube.com/channel/UCZwegPHTG4gvnR0WLzaq5OQ>
 - c. German Speakers Club – <https://www.youtube.com/@germanspeakersclub29>
- 2) App
 - a. Duolingo
 - b. Deutsche Welle
 - c. Dict.cc
 - d. Linguee

Name of the Program:	B.Tech/B.B. A/B.C. A/B.Sc/B.Pharm	Semester: 2	Level: UG/PG		
Course Name	Japanese Language skill -L2	Course Code/Course			
Course Pattern		Version	1.0		
Assessment/ Examination Scheme:					
Continuous Assessment/Internal Assessment		End Term Examination			
40%		60%			
Continuous Assessment/Internal Assessment (40%)					
Class Tests / Quizzes	Assignments	Oral / Speaking (会話)	Attendance & Participation	Listening Skills (Chyokai)	End Term Examination 60%
10	10	10	5	5	40%
Pre-Requisite: Desire to get acquainted with the Japanese language. Basic knowledge of Hiragana and Katakana.					
Course Objectives (CO):		The objectives of Basic Japanese language skill are: 1. To meet the needs of ever-growing industry, with respect to language support. 2. To get introduced to Japanese society and culture through language. 3. To promote multilingualism in exposing students to different cultures 4. Fostering respect for linguistic diversity. 5. Learning additional language to develop a better memory, talent for problem solving, ability to concentrate.			
Course Learning Outcomes (CLO):		Students would be able to: 1. Read & write words that have been borrowed from other language. 2. Comprehend and speak basic conversation with basic particles 3. Speak about Routine 4. Basic sentence patterns incorporated into short dialogues indicating how they are used in actual conversation. 5. Comprehend grammatical structure, and Improve communication abilities.			

Descriptors/Topics	CLO	Hours
UNIT I		
Hiragana & Katakana Series i. Reading and writing basic words ii. Read and Write Country iii. Speaking about daily routine, days, months.	CLO 1	6
UNIT II		
Katakana Script i. Katakana Script 3-6 ii. Katakana Script 6-10 iii. Kanji Writing – Weekdays.	CLO 2	6
UNIT III		
Basic Sentence formation i Minna no Nihongo lesson no. 1 ii Grammer - Basic sentence structure iii Affirmative and Negative iv General vocabulary: about family	CLO 3	6
UNIT IV		
Basic Sentence formation i Minna no Nihongo lesson no. 2- Vocabulary ii Grammer- Sentence formation using Demonstratives. iii Demonstratives- Affirmative and Negative iv Reading and speaking basic sentences.	CLO 4	6
UNIT V		
Minna no Nihongo lesson no. 3 i Vocabulary lesson no 3 ii Grammer- Sentence formation using Advanced Demonstratives. iii Demonstratives- Affirmative and Negative	CLO 5	6
Total Hours		30

>Learning Resources:

> Textbooks:

1. Minna no Nihongo, " Japanese for everyone", Elementary Main Textbook, Goyal Publishers & Distributors Pvt. Ltd.

> Reference books:

1. Shyoho Volume I
2. Genki Japan
3. Ham vol. 1 & 2

➤ Online Resources/E-Learning Resources:

<https://youtu.be/1JephUxTHxg?si=ouCwTXZc tYgY9Kh> 2. <https://youtu.be/9EtbkBkF2ag?si=rLNzc55REacMoGu3> 3. <https://youtu.be/DpEolYasvgv?si=dva9ue-YMSH03VOG>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: II		Level: UG	
Course Name		AI in Cyber Security		Course Code and Course Type		U26BSCS203/VAC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
2	-	-	2	30	50	-	-
Prerequisite: 1. Basic knowledge of computer fundamentals and programming concepts 2. Introductory knowledge of computer networks and cybersecurity concepts							
Course Objectives (CO):				The objectives of: 1. To introduce the fundamentals of Artificial Intelligence and its relevance in Cyber Security 2. To understand various cyber threats and explore AI-based detection techniques 3. To learn the application of Machine Learning algorithms in intrusion detection systems 4. To explore AI applications in network security, authentication, and incident response 5. To analyze ethical, legal, and emerging trends in AI-driven cyber security			
Course Learning Outcomes (CLO):				Students will be able to: 1. Explain the basic concepts of AI and Cyber Security and their integration 2. Identify different types of cyber threats and apply AI techniques for detection 3. Apply Machine Learning methods to design basic intrusion detection systems 4. Analyze the role of AI in securing networks and handling cyber incidents 5. Evaluate ethical issues and emerging trends in AI-based cyber security solutions			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I : Introduction to AI and Cyber Security		6
Overview of Artificial Intelligence: history, types (Narrow, General AI), and applications, Fundamentals of Cyber Security: concepts, need, and challenges, Intersection of AI and Cyber Security, Basics of Machine Learning, Deep Learning, and Neural Networks, Role of AI in enhancing cybersecurity defenses mechanisms, Challenges and limitations of AI in cybersecurity	CLO 1	
UNIT II: Cyber Threats and AI-Based Detection		6
Types of cyber threats: malware, phishing, ransomware, insider threats ,Signature-based vs behavior-based detection techniques, AI in malware detection and classification, AI-based	CLO	

phishing detection techniques, Anomaly detection using AI, Case studies of AI applications in threat detection	2	
UNIT III: Machine Learning for Intrusion Detection Systems		6
Introduction to Intrusion Detection Systems (IDS), Machine Learning approaches: supervised, unsupervised, reinforcement learning, Data preprocessing and feature selection for IDS, Building ML-based IDS models, Decision Trees and basic Neural Networks in IDS, Real-world applications of ML in intrusion detection	CLO3	
UNIT IV: AI for Network Security and Incident Response		6
AI in network traffic analysis and anomaly detection, AI for secure authentication and access control, AI-driven threat intelligence and automation, AI in incident response: detection to mitigation, Tools and platforms for AI-based cybersecurity, Applications of AI in cryptography and secure communication	CLO4	
UNIT V: Emerging Trends, Ethics, and Future Directions		6
Deep Learning applications in cybersecurity, Reinforcement learning in cyber defence Ethical and legal issues: privacy, bias, accountability, AI in offensive cybersecurity and dual-use concerns, Emerging technologies: AI in IoT security, blockchain security, quantum security, Future trends: predictive and proactive cyber defence	CLO5	
Total Hours		30

Learning resources

Textbooks:

1. Artificial Intelligence for Cybersecurity – by Charu C. Aggarwal
2. Machine Learning and Security – by Clarence Chio and David Freeman

Reference Books:

1. Deep Learning – by Ian Goodfellow, Yoshua Bengio, Aaron Courville
2. Cybersecurity and Cyberwar: What Everyone Needs to Know – by P. W. Singer and Allan Friedman
3. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow – by Aurélien Géron

Online Resources and E-Learning Resources:

<https://www.coursera.org/browse/data-science/machine-learning>
<https://www.coursera.org/browse/information-technology/cybersecurity>
<https://www.edx.org/learn/artificial-intelligence>
<https://www.edx.org/learn/cybersecurity>
<https://nptel.ac.in/courses/106106202>
<https://nptel.ac.in/courses/106105217>
<https://www.cybrary.it/catalog/cybersecurity/>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: II		Level: UG	
Course Name		Database Security And Sql Attacks		Course Code and Course Type		U26BSCS204/VAC	
Course Pattern		2026		Version		1.0	
Teaching Scheme				Assessment Scheme			
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
2	-	-	2	2	20	30	-
Prerequisite:							
Course Objectives (CO):				1. Understand the fundamentals of database systems and relational databases. 2. Learn SQL concepts for data retrieval and manipulation. 3. Identify database security risks and vulnerabilities. 4. Recognize SQL-based attacks and exploitation techniques. 5. Understand database protection mechanisms and secure practices.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Explain database concepts and relational models. 2. Apply basic SQL commands for database operations 3. Identify database threats and security challenges. 4. Analyze SQL injection attacks and vulnerabilities. 5. Recommend security controls for database protection.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I		
Introduction to Database Security: Introduction to Database Security, Need for Database Security, Database Security Goals, CIA Triad in Databases - Confidentiality, Integrity, Availability, Database Threat Landscape, Database Attack Surface, Sensitive Data and Privacy, Security Challenges in Modern Databases, Database Security Policies, Legal and Ethical Issues in Database Protection	CLO 1	6
UNIT II		
Database Vulnerabilities and Access Control: Database Vulnerabilities, Weak Authentication Issues, Misconfigured Database Servers, Default Accounts and Weak Passwords, Privilege Abuse, Insider Threats, Access Control Concepts, Authentication and Authorization, User Roles and Privileges, Principle of Least Privilege, Database Auditing Concepts, Secure User Management	CLO 2	6
UNIT III		

SQL Injection Fundamentals: Introduction to SQL Injection, Causes of SQL Injection, Vulnerable Query Concepts, Authentication Bypass Techniques, Types of SQL Injection - Error-Based SQL Injection, Union-Based SQL Injection, Blind SQL Injection, Risks and Impact of SQL Injection, Real-World SQL Injection Incidents	CLO3	6
UNIT IV		
Database Attacks and Threats: Database Enumeration, Data Extraction Attacks, Privilege Escalation, Brute Force Attacks, Data Leakage, Malware Targeting Databases, Database Denial of Service (DoS), Case Studies of Database Breaches	CLO4	6
UNIT V		
Database Security Controls and Best Practices: Secure Database Design Principles, Input Validation Concepts, Parameterized Queries, Prepared Statements, Encryption Concepts, Backup Security, Database Monitoring and Logging, Secure Configuration Guidelines, Best Practices for Database Security	CLO5	6
Total Hours		30

Learning resources

Textbooks:

1. M. Morris Mano — *Computer System Architecture*
2. Carl Hamacher — *Computer Organization*
3. William Stallings — *Computer Organization and Architecture*
4. Charles P. Pfleeger — *Security in Computing*
5. Michael E. Whitman and Herbert J. Mattord — *Principles of Information Security*

Reference Books:

1. Andrew Tanenbaum — *Structured Computer Organization*
2. Behrouz Forouzan — *Data Communications and Networking*
3. Nina Godbole — *Information Systems Security*
4. William Stallings — *Cryptography and Network Security*
5. Michael Goodrich — *Introduction to Computer Security*

Online Resources and E-Learning Resources

<https://nptel.ac.in/courses/106103068>

<https://nptel.ac.in/courses/106105163>

<https://www.netacad.com/courses/cybersecurity/cybersecurity-essentials>

<https://ocw.mit.edu/courses/6-823-computer-system-architecture-fall-2005/>

<https://owasp.org/www-project-security-awareness/>

<https://skillsbuild.org/students/course-catalog/cybersecurity>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: II		Level: UG	
Course Name		Data Science & Data Analytics using R		Course Code and Course Type		U26BSCS205/MOOC	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	1	4	4	40	60	-
Prerequisite: Basic computer knowledge, familiarity with spreadsheets, and elementary understanding of programming concepts; no prior experience in R or data science required.							
Course Objectives (CO):				The objectives of Data Science & Data Analytics using R: 1. To recall fundamental concepts of data science, data types, and basic syntax of R. 2. To explain data structures, data handling techniques, and visualization concepts in R. 3. To apply R programming to perform data manipulation and create basic visualizations. 4. To analyse datasets using descriptive statistics and visualization techniques to identify patterns. 5. To evaluate data insights to support decision-making while considering ethical aspects of data usage.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Identify different types of data and list basic R commands and data structures. 2. Describe how data is imported, cleaned, and organized using R data structures. 3. Demonstrate the use of R to create charts (bar, pie, histogram) and perform basic data operations. 4. Analyze datasets using R-based statistical summaries and visualizations to identify patterns. 5. Evaluate data insights to support decision-making and justify conclusions considering ethical issues.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I: Introduction to Data Science & R		
What is Data Science and Data Analytics? Importance of data in decision making; Data types: structured vs unstructured; Introduction to R and RStudio; Basic R syntax: Variables, data types, Operators, Simple input/output	CLO 1	9
UNIT II: Data Handling in R		
Data structures in R: Vectors, Lists, Matrices, Data Frames; Importing data (CSV, Excel); Data cleaning basics: Missing values, Filtering and sorting; Introduction to packages (e.g.,	CLO	9

dplyr – concept level)	2	
UNIT III: Data Visualization using R		
Importance of data visualization; Basic plots in R: Bar chart, Pie chart, Histogram; Introduction to visualization libraries: ggplot2 (basic usage); Customizing graphs (labels, colors, titles)	CLO3	9
UNIT IV: Basic Data Analysis		
Descriptive statistics: Mean, Median, Mode, Variance, Standard deviation; Data summarization using R; Correlation (basic idea); Identifying trends and patterns; Introduction to simple predictive idea; Case-Based Learning: Sales data analysis, Student performance analysis	CLO4	9
UNIT V: Data-Driven Decision Making & Applications		
Interpreting results and drawing conclusions; Data storytelling (presenting insights); Applications of data science: Business, Healthcare, social media; Limitations of data analysis; Ethics in data (privacy, bias)	CLO5	9
Total Hours		45

Learning Resources

Textbooks

1. R for Data Science (selected beginner-friendly chapters)
2. Data Science for Business (conceptual understanding)

Reference Books

1. Hands-On Programming with R (for basic R programming practice)
2. Practical Data Science with R
3. An Introduction to Statistical Learning (selected simple topics only)

Online Resources & E-Learning

<https://onlinecourses.nptel.ac.in>

<https://swayam.gov.in/explorer?category=AI%20and%20Data%20Science>

<https://www.coursera.org/specializations/r-programming-data-science>

<https://www.coursera.org/specializations/data-science-r>

<https://www.coursera.org/specializations/data-science-r-programming-tidyverse>

Name of the Program:		B.Sc. Computer Science (Cyber Security)		Semester: II		Level: UG	
Course Name		Digital Systems and Cyber Fundamentals		Course Code and Course Type		UCEXBC101/EXIT Policy	
Course Pattern		2026		Version		1.0	
Teaching Scheme					Assessment Scheme		
Theory	Practical	Tutorial	Total Credits	Hours	CIA (Continuous Internal Assessment)	ESA (End Semester Assessment)	Practical and Oral
3	-	1	4	4	40	60	-
Prerequisite: Basic computer knowledge, familiarity with spreadsheets, and elementary understanding of programming concepts; no prior experience in R or data science required.							
Course Objectives (CO):				The objectives of Data Science & Data Analytics using R: 1. To introduce the basics of digital systems and computer logic. 2. To understand cyber fundamentals and safe digital practices. 3. To develop awareness about cyber threats and security measures. 4. To familiarize students with digital communication and internet technologies. 5. To provide foundational knowledge useful for higher studies and employability.			
Course Learning Outcomes (CLO):				Students will be able to: 1. Understand the fundamentals of digital systems and their applications in modern computing. 2. Apply number system conversions and analyze basic logic gate operations in digital circuits. 3. Explain the basics of computer networks, internet technologies, and digital communication systems. 4. Identify common cyber threats and implement appropriate cyber security and data protection practices. 5. Demonstrate ethical and responsible use of digital technologies while understanding emerging trends in cyber security and computing.			

Course Contents and Syllabus:

Descriptors and Topics	CLO	Hours
UNIT I:		
Fundamentals of Digital Systems: Introduction to Digital Electronics, Analog vs Digital Systems, Components of Digital Systems, Binary Concept and Digital Signals, Basics of Computer Architecture, Applications of Digital Systems	CLO 1	9
UNIT II:		

Number Systems and Logic Gates: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, Number System Conversions, Binary Arithmetic, Introduction to Boolean Algebra, AND Gate, OR Gate, NOT Gate, NAND Gate, NOR Gate, Applications of Logic Gates	CLO 2	9
UNIT III:		
Computer Networks and Internet Basics: Basics of Computer Networks, Types of Networks: LAN, MAN, WAN, Internet Fundamentals, Web Fundamentals, IP Address Basics, Domain Name System, Communication Protocols, Cloud Computing, Digital Communication	CLO3	9
UNIT IV:		
Cyber Security Fundamentals: Introduction to Cyber Security, Types of Cyber Threats, Malware, Phishing, Ransomware, Password Security, Authentication Methods, Data Privacy, Data Protection, Safe Browsing Practices	CLO4	9
UNIT V:		
Cyber Ethics, Safety and Emerging Technologies: Cyber Laws, IT Act Basics, Cyber Ethics, Responsible Digital Behavior, Social Media Safety, Digital Footprint, Online Reputation, Introduction to Artificial Intelligence, Internet of Things (IoT), Blockchain Technology, Future Trends in Cyber Security	CLO5	9
Total Hours		45

Textbooks

1. *Digital Fundamentals* — Digital Fundamentals
2. *Computer Fundamentals and Cyber Security* — Computer Fundamentals and Cyber Security
3. *Cyber Security Essentials* — Cyber Security Essentials

Reference Books

1. Digital Logic and Computer Design — *Digital Logic and Computer Design*
2. Computer Networks — *Computer Networks*
3. Principles of Information Security — *Principles of Information Security*

Online Resources

1. <https://nptel.ac.in/>
2. <https://www.netacad.com/>
3. <https://www.cisa.gov/>