

DEPARTMENT OF LIFELONG LEARNING

SYLLABUS FOR SESSION 2026 -27

One Year Diploma in Cybersecurity



GURU NANAK DEV UNIVERSITY, AMRITSAR

The **One Year Diploma in Cybersecurity** is being conducted under the **Annual Examination System** by the **Department of Lifelong Learning, Guru Nanak Dev University, Amritsar**. After successful completion of one year and passing the final examination, a candidate shall be awarded a **Diploma in cybersecurity**. The cyber security course provides fundamental knowledge in the computers, Computer networks, and cloud computing and cyber security technology. This course provides hands-on experience with cutting-edge tools to help the student enter in the field of cyber security. Students will learn network assessment and protection encryption and decryption methods using python Programming.

Note:

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PROGRAMME OBJECTIVES

The **One Year Diploma in cybersecurity** is designed to enhance students skills by providing skill-oriented focused curriculum. This prepares students for careers and entrepreneurship in the IT and web industry. Every cybersecurity Program is built around these fundamental objectives:

- **Data privacy:** Ensuring that only authorized individuals can access information through the use of encryption, access controls, and need-to-know principles.
- **Data accuracy and consistency:** Ensure that authorized users can access information and resources quickly and reliably through the use of backups, redundancy, and disaster recovery strategies.
- **Identity Verification:** This involves verifying the identity of users, devices, and systems before granting access to resources..
- **Permission Management:** Apply role-based access controls and the principle of least privilege so that users are granted access only to the resources required for their responsibilities..

PROGRAMME OUTCOMES

- The cybersecurity course provides fundamental knowledge in the computers, Computer networks, cloud computing and cybersecurity technology
- This course provides hands-on experience with cutting-edge tools to help the student enter and advance in the field of cybersecurity.
- Students will learn penetration testing, network assessment and protection, intrusion detection, and encryption and decryption methods.

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Chairperson

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ORDINANCES

- 1. Duration of Course :-**
 - a. Examination will be held once at the end of course after one year as per G.N.D.U schedule.
- 2. Eligibility :-**
 - a. The candidates who have passed 12th Class examination with minimum 35% marks.
- 3. Mode of Admission :**
 - a. The admission will be made by a committee constituted by the Worthy Vice-Chancellor strictly on the basis of the merit of the candidates in 12th class.
 - b. If any of the admitted student remains absent consecutively for fifteen days without prior information and permission of heading authority from the commencement of the course, the name of such candidate shall be struck off from the rolls of the department and the next candidate on the waiting list in order of merit of the respective course shall be admitted in his/her place with the permission of the Director of the department.
- 4. Attendance Instructions:**
 - a. The students admitted to one year diploma/Six Month certificate course, who remain absent consecutively for 15 working days during the duration of the course without any information to the department their name(s) shall be stuck of from rolls of the department with the permission of Dean Academic Affairs.
 - b. The students admitted in one year Diploma, if they attain less than 25% of the total attendance in six months their name(s) shall be stuck of from rolls of the department with the permission of Dean Academic Affairs.
 - c. The students admitted in six month certificate course, if they attain less than 25% of total attendance in three months, the name(s) of such students shall be stuck off from rolls of the department with the permission of Dean Academic Affairs.
 - d. Attended not less than 75% of the full course of lectures delivered and practical arranged for the class.
 - e. The Director of the department shall have the power to condone shortage of lectures in each paper up to 15% of total taken separately.
- 5. Fees:**
 - a. According to the schedule, every candidate shall pay such fees to the university as per university rules.
- 6. General Instructions:-**
 - a. The candidate shall be eligible to appear in the examination provided :
 - He/ She bears good moral character.
 - b. The examination shall be held in accordance with the syllabus prescribed by the Department from time to time.

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- c. The examination shall consist of Practical and Exhibit Display.
- d. The Practical paper shall be set by examiner on the spot.
- e. The medium of instruction/examination shall be English/Punjabi/Hindi in general.
- f. The marks of exhibit display shall be based on House Test and performance of the students.
- g. The marks of exhibit display shall be submitted to the Director of the Department fifteen days before the commencement of the examination.
- h. Minimum number of marks required to pass the examination shall be 35% in each Practical/Exhibit Display separately.
- i. If the candidate Absent/Fails in one or more Practical Examination her result shall be declared Fail.
- j. The result shall be declared and published by the Department.
- k. The successful candidates shall be awarded division according to the following criteria: -
 - a. Those who obtain 60% or more marks – First division.
 - b. Those who obtain 50% or more but less than 60% marks – Second Division
 - c. Those who obtain 35% or more marks but less than 50% - Third Division
- l. Each successful candidate shall be awarded a Certificate Signed by the Director of the Department showing the division and the Aggregate Marks obtained.
- m. Fee for issuing of duplicate certificate shall be decided from time to time by the approval of the worthy Vice-Chancellor.

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SCHEME OF STUDY AND EXAMINATION

Course Code	SCHEME OF STUDY		SCHEME OF EXAMINATION	
	Name of Paper	Credits/ Hrs per week	Total Marks	Examination Hrs.
CS101	Paper-I (Theory) Introduction to Computers & Cybersecurity	6 Hrs.	75	3 Hrs.
CS102	Paper-II (Practical-I) Basics of Python	5 Hrs.	100	4 Hrs.
CS103	Paper-III (Practical-II) Linux Operating System	5 Hrs.	100	4 Hrs.
CS104	Project	2 Hrs.	50	
CS105	Seminar/Presentation	2 Hrs.	25	
	Total		350	

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CRITERIA FOR ADMISSION

The Committee makes the following recommendations after deliberations:-

1.	Name of the Course	One Year Diploma in Cybersecurity	
2.	Duration	One Year	
3.	Commencement of Course	July, Every Year	
4.	Eligibility	10+2 pass candidates from any recognized board with minimum 35% marks.	
5.	Venue	Department of Lifelong Learning, Guru Nanak Dev University, Amritsar.	
6.	No. of Seats	40 seats	
7.	Mode of Admission	(i) The admission will be made by a committee duly constituted by the worthy Vice-Chancellor strictly on the basis of the merit of the candidates in 10+2. (ii) If any of the admitted student remains absent consecutively for fifteen days without prior information and permission of the heading authority, his/her name shall be struck off from the rolls of the Department and the next candidate on the waiting list in order of merit of the respective course shall be admitted in his/her place with the permission of the Director of the Department.	
8.	Fee Structure	Total Fee: Rs. 22450/-	
	Total fee (July 2026- June 2027)	Rs. 22450/- which includes (To be deposited at the time of Admission) Admission Fee = Rs. 2200/- Examination Fee = Rs. 1400/- Tuition Fee: Rs. = Rs. 18600/- Identity Card Fee = Rs. 250/-	
9.	Late fee at the time of admission	July 2026 to June 2027	Fees
		May 8 th 2026 to July 31 st 2026	Nil
		Aug 3 rd 2026 to Aug 11 th 2026	Nil
		Aug 12 th 2026 to Aug 20 th 2026	Rs. 3000/-
		Aug 21 st 2026 to Aug 31 st 2026	Rs. 4000/-
		Sep 1 st 2026 to Sep 10 th 2026	Rs. 6000/-
		Sep 11 th 2026 to Sep 20 th 2026	Rs. 9000/-
		Within 15 Days from the date of closing of admission.	Rs. 10000/-
10.	Review of Course of Reading	The syllabus committee constituted by the worthy Vice Chancellor will review the course of reading for the session.	
11.	Conduct of Examination Evaluation & Award of Certificate.	To be decided with the approval of worthy Vice-Chancellor.	

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PAPER – I (THEORY)

CS101:- Introduction to Computers & Cybersecurity

Time: 3 Hrs.

Max Marks.: 75

Course Objectives:

1. To understand basics concepts of operating system and networking.
2. To understand basics of Cryptography and Network Security.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for network security to protect against the threats and attacks in the Networks.
5. To learn various cryptography techniques.

Instructions for the Paper Setters:

The paper setter is required to set 9 questions in all and the students are required to attempt 05 questions. First question is compulsory and consists of 15 short answer type questions of one mark each which will be from entire syllabus. Section “A”, “B”, “C”, “D” consists of 2 questions. Each student is required to attempt 1 question from every section and all questions carry 15 marks each.

SECTION-A

Introduction to Operating System

1. Basics of computer systems: hardware and software, input/output devices
2. Operating System (OS), role and functions
 - User interface
 - File management
 - Process management
 - Memory management
3. OS components: kernel, shell, system calls, user interface
4. File Management System:
 - Concept and types of files (text, binary, executable)
 - File attributes (name, type, size, permissions)
 - File operations (create, read, write, append, delete)
 - File system architecture (file control block, directories)

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SECTION B

Internet Fundamentals & Cybersecurity Basics

1. Introduction to the Internet and web browsing
2. Basic networking concepts: IP address, MAC address
3. Introduction to cybersecurity and its importance
4. Cybersecurity fundamentals:
 - Types of threats (Malware, Hackers, Trackers)
 - Types of attacks (Virus, Worms, Trojans, Spam)
5. Security practices and tools:
 - Anti-virus software and security tools
 - Strong passwords and password management
6. Cryptography basics:
 - Encryption and decryption
 - Public and private key cryptography
 - Digital signatures
7. Network security concepts:
 - Firewalls
 - Intrusion detection systems (IDS)
 - Stages of network attacks and need for monitoring

SECTION-C

1. Computer Networks & Security Frameworks

- Computer networks: Definition and types (LAN, WAN, MAN, PAN)
 - Communication media and networking devices (routers, switches, hubs, bridges, modems)
 - Network topologies (Bus, Star, Ring, Mesh, Tree)
 - Governance, risk, and compliance:
 - Data protection, privacy, and data classification
 - Risk management and vulnerability assessment
 - Role of regulatory bodies in cybersecurity
 - Cloud Computing
 - a. Characteristics of Cloud Computing
 - b. On-demand, Resource pooling, Scalability
 - c. Service Models: IaaS, PaaS, SaaS; Deployment Models:
 - d. Public Cloud, Private Cloud, Hybrid Cloud
 - e. Key Cloud Providers: AWS, Google Cloud, Microsoft Azure
- 2. Cybersecurity standards and frameworks:**
- ISO/IEC 27001 (key components)

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- NIST Cybersecurity Framework
- GDPR overview

3. Ethical hacking fundamentals:

- Role of ethical hackers
- Types of hackers (White, Black, Gray Hat)
- Hacking lifecycle (reconnaissance, exploitation, post-exploitation)
- Legal and ethical considerations

SECTION-D

Cyber Laws, Compliance & Digital Forensics

1. Cybersecurity laws and regulations:

- IT Act 2000 (India) and amendments
- Role of CERT-In
- Compliance requirements for organizations

2. International compliance standards:

- GDPR (legal implications)
- HIPAA (overview and penalties)
- PCI DSS (compliance and auditing requirements)

3. Advanced security concepts:

- Security principles: Confidentiality, Integrity, Availability (CIA Triad)
- Authentication, Authorization, and Accounting (AAA)
- Threats, vulnerabilities, and risk management
- Security models and frameworks (e.g., Zero Trust Architecture)

4. Social engineering and physical security:-

- Introduction to social engineering and human-based attacks
- Psychology of manipulation (trust, authority, urgency, fear)
- Types of social engineering attacks:
- Phishing, spear phishing, whaling
- Pretexting and impersonation
- Baiting and quid pro quo attacks
- Tailgating and shoulder surfing
- Social engineering attack lifecycle

5. Steganography and its role in cybersecurity

6. Digital forensics:

- Forensic readiness and investigation process
- Legal and ethical considerations
- Challenges and limitations
- Limitations of forensics
- International cooperation in digital evidence collection

7. Emerging trends in cybersecurity regulations:-

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- Evolution of cybersecurity laws and policies
 - Importance of regulatory compliance in digital systems
 - Global vs. regional cybersecurity governance
 - Role of governments, industry bodies, and standards organizations
- 8. Case studies from real-world cybersecurity compliance challenges**
- 9. Comparative analysis of national cybersecurity regulations**
- a. Analysing application of a cybersecurity framework in an organization
 - b. Including potential compliance issues and solutions

Course Outcomes:

1. Provide security of the data over the network.
2. Understand the concept of cryptography and network security.
3. Implement various networking protocols such as TCP/IP.
4. Understand and analyses data encryption standard,
5. Outcomes of Cryptography.

References:

- Silberschatz, A., Galvin, P. B., & Gagne, G. (2020). *Operating System Concepts* (10th ed.). Wiley.
- Stallings, W. (2021). *Operating Systems: Internals and Design Principles* (9th ed.). Pearson Education.
- Kurose, J. F., & Ross, K. W. (2021). *Computer Networking: A Top-Down Approach* (8th ed.). Pearson.
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- Stallings, W. (2020). *Cryptography and Network Security: Principles and Practice* (8th ed.). Pearson.
- Whitman, M. E., & Mattord, H. J. (2022). *Principles of Information Security* (7th ed.). Cengage Learning.
- Bishop, M. (2022). *Computer Security: Art and Science* (2nd ed.). Addison-Wesley.
- Stallings, W. (2022). *Network Security Essentials: Applications and Standards* (7th ed.). Pearson.
- Engebretson, P. (2021). *The Basics of Hacking and Penetration Testing* (2nd ed.). Syngress.
- OccupyTheWeb. (2020). *Linux Basics for Hackers*. No Starch Press.
- Krutz, R. L., & Vines, R. D. (2020). *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*. Wiley.
- Marcella, A. J., & Menendez, D. (2021). *Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes*. Auerbach Publications.

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PAPER – II
(PRACTICAL–I)
CS102:- Basics of Python

Time: 4 Hrs.

Max. Marks: 100

Course Objectives:

1. Demonstrate the ability to solve problems using system approaches, critical and innovative thinking, and technology to create solutions.
2. Understand the purpose and technology to create solutions.
3. Create scripts in Python.
4. Design and develop applications using Python.

Introduction to Python:- Interpreter and IDEs, Getting and Setting up Python. Python Program structure, creating, saving and executing a Program, comments, Indentation. Data and Expressions: Literal Constants, numbers, strings – immutable strings, quotes, the escape sequence, the format methods, Variables and Identifiers, constants, data types, object,

Operators & Expressions – short cuts, evaluation order, Boolean Expressions (Conditions), Logical Operators. User Input/output Control Flow: Selection Control, Nested conditions, Loops, break and Continue Statements, Data Structures: list, tuple, dictionary and set; basic operations e.g. creating, indexing, slicing, membership

Functions: defining and calling functions, passing and returning values, local and global variables, recursive functions, Iteration vs. Recursion Modules: purpose and usage, the import statement, from import statement, the `__main__` attribute, creating a module and importing, the `dir()` function Handling Exceptions – try catch and with statements, errors, debugging.

Files and String handling:- Opening Files, Using Text Files, Reading files, writing files, Understanding read functions, Understanding write functions.

Cryptography using Python:- Caesar Cipher implementation, Encryption/Decryption basics, Libraries: hashlib, cryptography. Networking: Socket module, Port Scanning, Packet Sniffing, Traffic Analysis,. HTTP Communications with Python built in Libraries.

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Practical Implementation based on Using Python Programming

1. Python Program to print "Hello World"
2. Python Program to print area of rectangle
3. Python Program to print area and perimeter of circle
4. Python Program to print area of right angled triangle
5. Python Program to find roots of quadratic equation
6. Python Program to swap two variables
7. Python Program to print grade of students according to marks
8. Python Program to Check Prime Number
9. Python Program to Print all Prime Numbers in an Interval
10. Python Program to Find the Factorial of a Number
11. Python Program to Check Armstrong Number
12. Python Program to print all odd numbers and even numbers of given range
13. Python Program to print largest digit of a given number
14. Python Program to print reverse of a given number
15. Python Program to print Fibonacci series
16. Python Program to Find LCM
17. Python Program to Find HCF
18. Python Program to Make a Simple Calculator
19. Python Program to Display Calendar
20. Python Program of different patterns For instance:
1
12
123
1234
21. Python PROGRAMs related to functions
22. Python Program related to lists, tuples and dictionaries
23. Python Program to Display Calendar
24. Python Program of different patterns For instance:
1
12
123
1234
25. Python PROGRAMs related to functions

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Assignments

1. Strong passwords prevent unauthorized access. A secure password includes uppercase, lowercase, numbers, and symbols.
 - Input password
 - Check length ≥ 8
 - Check digits, uppercase, lowercase, special characters
 - Display strength
2. Caesar cipher shifts characters by a fixed number.
 - Input text and shift
 - Shift each character
 - Display encrypted text
3. To encrypt content of a text file.
 - Read file
 - Apply encryption
 - Save output
4. Port Scanner
 - To scan open ports of a system.
5. Log File Analyzer
 - To detect suspicious patterns in logs.
6. Password Hashing
 - To hash passwords securely.
7. File Decryption
 - To decrypt encrypted file.

Course Outcomes:

1. Describe the core syntax and semantics of Python Programming language.
2. To understand the importance of strings and functions in programming for efficient data handling, modularity, and code reusability..
3. HTTP Communications with Python built in Libraries
4. Infer the Object-oriented Programming concepts in Python.
5. Examining metadata and windows registry
6. Associate python Programming with real life problems.

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Paper- III

Practical -II

CS103:- Operating Systems & Linux

Time: 4 Hrs.

Max. Marks: 100

Objectives:-

- The main objectives of the Operating Systems and Kali Linux are to provide an understanding of how operating systems manage system resources, processes, memory, and security
- To develop practical skills in using Kali Linux for ethical hacking, penetration testing, and basic cybersecurity practices.

Introduction:- Installing a Linux distribution standalone (e.g., Ubuntu)/ in a virtual machine; Practicing basic terminal commands: Common terminal commands (e.g., cd, ls, mkdir, rm); Editing files with basic text editors (e.g., vi); File permissions and ownership (chmod); Setting up an antivirus. Practicing basic terminal commands: Common terminal commands. Ls, cat, less, head, tail, nano, vi or List files and directories, pwd, cd ,mkdir, rmdir, rm, cp, mv, editing files with basic text editors (e.g., vi Editor), Exploring basic Linux security tools (e.g., netstat, ifconfig); Monitoring and analysing network traffic; Hands on the Wireshark packet sniffer.

Using Kali Linux - Installing and configuring Kali Linux; Basic Kali Linux commands for security testing; Practicing vulnerability scanning and network analysis. Kali's tools Nmap, Metasploit, and Burp Suite, Performing basic penetration testing on a virtual machine, Reporting findings in a simulated penetration test, Network reconnaissance and analysis.

User Management Commands :- adduser, passwd, deluser username, who, permission Commands e.g. chmod, chown, ls -l, sudo apt update, sudo apt upgrade, sudo apt install package_name, sudo apt remove package_name. Linux commands for security testing; Practicing vulnerability scanning and network analysis.

System Maintenance:- Clear, history, reboot, shutdown now, Installation and Basic Commands of NMAP, NESSUS, netstat, tcpdump, chmod 777 file , nmap -sS, target_ip, nmap -sV target_ip, nmap -A target_ip, nmap -p 1-1000 target_ip.

Password Attacks (Ethical Use):- Hashing concepts in Linux, John the Ripper (password cracking basics), Hydra (brute force simulation in lab environment), Password strength analysis.

SQL Injection:- Introduction to SQL and databases, Basic SQL queries (SELECT, INSERT, DELETE), Understanding SQL injection concept, Testing SQL injection in a controlled lab environment (DVWA / bWAPP), Prevention techniques (prepared statements, input validation).

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Project

Cyber Security Toolkit (Python)

Project Title: Cyber Security Toolkit using Python

To develop an integrated Python-based toolkit that performs basic cyber security operations such as:

- Port Scanning
- Password Strength Checking
- File Encryption/Decryption
- Log Analysis

Objectives

- To apply Python Programming in real-world cyber security tasks
- To build a menu-driven security tool
- To understand automation in cyber security

Concept

This project combines multiple small tools into a **single menu-driven application**, helping users perform basic security operations from one interface.

Modules Used

- socket – for port scanning
- hashlib – for hashing
- cryptography – for encryption
- re – for log analysis

General Flow

- Display menu
- Take user choice
- Call respective function
- Repeat until exit

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- Tanenbaum, A. S., & Bos, H. (2019). Modern Operating Systems (4th ed.). Pearson.
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- Engebretson, P. (2021). The Basics of Hacking and Penetration Testing (2nd ed.). Syngress.
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- Clarke, J. (2021). SQL Injection Attacks and Defense. Elsevier / Syngress.

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Hardware and Software Requirements

Hardware Requirements

- **Processor:** Intel i5/i7 or AMD Ryzen 5/7
- **RAM:** 16 GB
- **Storage:** 512 GB SSD or more
 - USB ports (for bootable tools like Kali Linux)
 - Good internet connection (for labs, downloads, updates)
- Router

Operating Systems

- Windows 11 or Windows 10 (primary OS)
- Kali Linux (for ethical hacking tools)
- Ubuntu (for learning Linux basics)

Virtualization Software

Used to run multiple systems on one computer:

- VirtualBox (free)

3. Networking & Security Tools

- Wireshark
- Nmap
- Metasploit
- Burp Suite
- John the Ripper

4. Programming & Scripting Software

- Python
- Note Pad ++
- Visual Studio Code (for coding)

5. Other Useful Tools

- Web browsers (Chrome, Firefox for testing)

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Panel of Examiners

The Panel of Examiners recommended by the syllabus committee for the Annual examination of One Year Diploma in Web Designing and Development 2026-26 at University Campus and for the Re-appear exam which is to be held as per Ordinance.

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