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Aegis: Charutar Vidya Mandal (Estd.1945)

	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSC01001
Course Title:	Ethical Hacking Essentials
Course Group:	Discipline Specific Core- I (DSC-I)

Course Objectives:

- Understand and apply ethical hacking principles, tools, and methodologies to assess and mitigate security risks, while adhering to legal and ethical standards.
- Understand and apply social engineering concepts, recognize common attack techniques, and implement countermeasures to mitigate risks like phishing, pretexting, identity theft, and password cracking.
- Analyze and apply countermeasures to network security threats, including packet sniffing, DoS/DDoS attacks, cloud computing risks, and wireless network vulnerabilities, ensuring comprehensive protection of digital infrastructure.
- Analyze and mitigate security risks in mobile devices, IoT systems, and Operational Technology (OT), implementing effective countermeasures and secure practices to protect these platforms from cyber threats.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* J: Jury; V: Viva; P:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Ethical Hacking Fundamentals: • Information Security Fundamentals • Laws and Regulations • Cyber Kill Chain • Hacking Concepts & Hacker Classes • Phases of Hacking Cycle	10



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2	Threats, Vulnerabilities & Tools • Ethical Hacking Scope & Limitations • Ethical Hacking Tools • Threats and Threat Sources • Malware and Types • Vulnerabilities & Vulnerability Assessment	10
3	Social Engineering & Password Attacks • Social Engineering Concepts & Phases • Social Engineering Techniques • Insider Threats & Identity Theft • Password Cracking Techniques & Tools	10
4	Password Tools & Countermeasures • Password Cracking Tools • Social Engineering Countermeasures • Password Cracking Countermeasures	10
5	Network, Wireless & Cloud Attacks • Sniffing • Packet Sniffing Concepts • Sniffing Techniques - Sniffing Countermeasures • Denial-of-Services Attacks • DoS/DDoS Countermeasures • Cloud Computing Threats • Wireless Terminology - Wireless Encryption - Wireless Network- Specific Attack Techniques- Bluetooth Attacks - Wireless Attack Countermeasures	10
6	Mobile, IoT & OT Security • Mobile Attacks & Countermeasures • Mobile Device Management (MDM) • IoT Concepts, Threats & Countermeasures • OT Concepts & Security	10

Reference Books:

1	"The Web Application Hacker's Handbook" by Dafydd Stuttard and Marcus Pinto
2	"Hacking: The Art of Exploitation" by Jon Erickson

Supplementary learning Material:

1	Cybrary (https://www.cybrary.it).
2	Wireshark (https://www.wireshark.org)
3	OWASP (Open Web Application Security Project) (https://owasp.org)



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Pedagogy:

- Justify all the topics unit-wise
- Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	40	20	20	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Understand ethical hacking principles, methodologies, and legal considerations.	16
SLO-2	Apply ethical hacking tools and techniques to identify vulnerabilities and mitigate security risks.	17
SLO-3	Understand and analyze social engineering techniques and password attacks.	17
SLO-4	Implement countermeasures to mitigate social engineering and password-based attacks.	16
SLO-5	Analyze network, wireless, and cloud security threats and apply appropriate countermeasures.	17
SLO-6	Analyze and mitigate security risks in mobile devices, IoT systems, and operational technology.	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 - High, 2 - Moderate, 1 - Low, - No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	2	-	2	3	-	-	2	1	2	2	-	3	-
SLO-2	3	3	2	3	2	2	1	3	2	2	3	3	2	1
SLO-3	2	3	-	2	2	-	-	3	2	1	2	2	2	-
SLO-4	2	3	-	3	3	2	-	3	2	1	3	2	3	-
SLO-5	3	3	3	3	2	3	2	3	2	2	3	3	2	1
SLO-6	3	3	3	3	2	2	2	3	2	2	3	3	2	2



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Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓
SDG-16: Peace, Justice & Strong Institutions	✓	✓	✓	✓	✓	✓

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	March, 2026
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	March, 2027



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	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSC01002
Course Title:	Introduction to RDBMS
Course Group:	Discipline Specific Core- II (DSC-II)
Course Objectives: - Understand and apply fundamental SQL operations using MySQL Workbench for basic database creation, data manipulation, and retrieval. - Design normalized database schemas and executes intermediate-level SQL queries involving joins, subqueries, and schema modifications. - Implement stored procedures, functions, triggers, and apply optimization and backup techniques to enhance database performance and reliability. - Manage database users and security configurations, and develop a complete database project incorporating advanced SQL and best practices.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* J: Jury; V: Viva; P:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to MySQL Workbench and Basic Database Management - Introduction to Databases and MySQL - Types of Databases: Relational vs. Non-Relational - Overview of SQL and MySQL - Installing MySQL and MySQL Workbench - Introduction to MySQL Workbench: Interface and Navigation - Establishing a Connection to MySQL Server	10



2	Basic SQL Queries and Data Handling • CREATE DATABASE, CREATE TABLE • Basic SELECT, INSERT, UPDATE, DELETE Queries • Introduction to Data Types in MySQL Filtering and Sorting Data • WHERE Clause, AND, OR Operators • ORDER BY and LIMIT Clauses • Basic Aggregation: COUNT, AVG, SUM, MIN, MAX	10
3	Database Normalization and Relationships • What is normalization? (1st, 2nd, 3rd Normal Forms) • Primary Key, Foreign Key, and Indexes • One-to-many, Many-to-many relationships	10
4	Advanced SQL Queries and Database Structure Management • JOIN Operations (INNER, LEFT, RIGHT, FULL OUTER) • Aggregation with GROUP BY and HAVING Clauses • Subqueries (Nested, Correlated, Scalar Subqueries) Managing Database Structure • ALTER TABLE (Add, Modify, Drop columns) • Using Indexes to optimize queries • Handling Constraints (Unique, NOT NULL, etc.)	10
5	Stored Procedures, Functions, Triggers, Optimization and Backup • Understanding and Creating Stored Procedures • Introduction to Functions in MySQL • Creating Triggers (BEFORE, AFTER triggers) Database Optimization • Query optimization techniques • Using the EXPLAIN command to analyze query performance • Indexing strategies for performance improvement Backup and Recovery • Exporting and Importing Databases • Using MySQL Workbench for creating backups • Restoring data from backups	10
6	User Management, Security, and Project Implementation • Creating and managing MySQL users • GRANT, REVOKE, and SHOW GRANTS commands • User roles and privileges Security Best Practices • Securing MySQL Workbench and MySQL Server • Implementing encryption in MySQL • Managing secure connections and SSL configurations	10



	Final Project Overview and Guidelines - Project goals and objectives - Designing and developing a real-world database application - Implementing advanced SQL queries, stored procedures, and triggers	
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Reference Books:		
1	Learning MySQL - Seyed M.M. Tahaghoghi, Hugh E. Williams - Publisher: O'Reilly Media	
2	Database System Concepts (7th Edition)- Abraham Silberschatz, Henry Korth, S. Sudarshan -McGraw-Hill	
3	"Learning MySQL" by Seyed Tahaghoghi and Hugh Williams <i>Publisher: O'Reilly Media</i>	
4	"MySQL: The Complete Reference" by Vikram Vaswani <i>Publisher: McGraw-Hill Education</i>	
5	"MySQLTutorial" by Luke Welling and Laura Thomson <i>Publisher: Addison-Wesley Professional</i>	

Supplementary learning Material:

1	MySQL Workbench Documentation for reference.
2	W3Schools MySQL Tutorial for SQL basics and examples.
3	MySQL Official Documentation for deeper insights into advanced topics.

Pedagogy:

- Justify all the topics unit-wise - Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment - Internal / External Examination as per the norms of CVM University
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Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	40	20	20	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Understand fundamental SQL concepts and MySQL Workbench environment for database creation.	16
SLO-2	Apply SQL operations for data manipulation and retrieval using SELECT, INSERT, UPDATE, and DELETE queries.	17
SLO-3	Design normalized database schemas using keys, relationships, and constraints.	17



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SLO-4	Execute intermediate and advanced SQL queries including joins, subqueries, and schema modifications.	16
SLO-5	Implement stored procedures, functions, triggers, and apply optimization and backup techniques.	17
SLO-6	Manage database users, security configurations, and develop a complete database project using best practices.	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 – High, 2 – Moderate, 1 – Low, – No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	1	–	2	–	–	–	–	1	2	2	–	–	–
SLO-2	3	2	–	3	–	2	–	–	2	2	3	1	–	–
SLO-3	3	2	–	3	–	2	–	–	2	2	3	1	–	–
SLO-4	3	3	1	3	–	2	–	–	2	2	3	2	–	–
SLO-5	3	2	2	3	1	3	–	–	2	2	3	2	1	1
SLO-6	3	2	2	3	3	2	–	–	3	2	3	2	3	1

Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓
SDG-11: Sustainable Cities & Communities	–	✓	✓	✓	✓	✓
SDG-13: Climate Action	–	–	✓	✓	✓	✓

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	March, 2026
Last Reviewed on (Month-Year):	–
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	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSC01003
Course Title:	Data Communication and Computer Networks (DCCN)
Course Group:	Discipline Specific Core- III (DSC-III)
Course Objectives: • Understand fundamental concepts of data communication, including transmission, bandwidth, signal types, and communication principles. • Analyze network models, protocols, and standards such as OSI, TCP/IP, and key communication protocols used in modern networks. • Apply IP addressing techniques including IPv4, subnetting, IPv6, and routing mechanisms for efficient network design. • Evaluate and implement networking concepts related to transport layer protocols, network services, virtualization, cloud computing, and basic network security mechanisms.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* J: Jury; V: Viva; P:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Fundamentals of Data Communication • Introduction • Network Types • Data Transmission • Bandwidth and Throughput • Communication Principles	10



2	Communication Protocols & Network Models • Communication Protocols • Communication Standards • OSI Model • Encapsulation	10
3	IP Addressing (IPv4 & IPv6 Basics) • Binary Numbering • IPv4 Address Structure • Classes and Types of Addresses • Assigning IPv4 Addresses • Subnetting	10
4	Advanced IP Addressing & Routing • Need for IPv6, Custom Subnetting • IPv6 Address Structure • IPv6 Address Types & Data Flow • Routing between Networks	10
5	Common Protocols, Ports & Transport Layer • DHCP, DNS, FTP, HTTP, SMTP, POP3, IMAP, SMTP • Secure Protocols (HTTPS, SSL, SFTP, SSH) • TCP, UDP, ICMP, ARP, IPsec, GRE • Application Layer Protocols	10
6	Virtualization & Cloud Computing • Virtualization Concepts • Virtual Networking • Cloud Deployment Models • Cloud Service Models • Practical Use of Virtualization & Cloud	10

Reference Books:

1	"Data Communications and Networking" – Behrouz A. Forouzan
2	Computer Networking: A Top-Down Approach – James F. Kurose, Keith W. Ross

Supplementary learning Material:

1	Cisco Networking Academy – https://www.netacad.com/ .
2	NPTEL Online Networking Courses – https://nptel.ac.in/
3	Coursera - Networking Courses – https://www.coursera.org/



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Pedagogy:

- Justify all the topics unit-wise
- Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	40	20	20	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Understand the fundamentals of data communication including transmission, bandwidth, and communication principles.	16
SLO-2	Analyze signal transmission, error detection, and communication techniques.	17
SLO-3	Explain network models such as OSI and TCP/IP and networking protocols and standards.	17
SLO-4	Apply IP addressing concepts including IPv4, subnetting, IPv6, and routing mechanisms.	16
SLO-5	Analyze core internet and transport layer protocols such as TCP, UDP, ICMP, ARP, DNS, and DHCP.	17
SLO-6	Understand advanced networking concepts including virtualization, cloud computing, and network security basics.	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 – High, 2 – Moderate, 1 – Low, – No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	2	–	2	–	–	–	–	1	2	2	–	–	–
SLO-2	3	3	–	3	–	2	–	–	1	2	2	2	–	–
SLO-3	3	3	2	2	–	2	–	–	1	2	2	2	–	–
SLO-4	3	3	3	3	–	2	–	–	2	2	3	2	–	–
SLO-5	3	3	2	3	1	2	1	–	2	2	3	3	1	1
SLO-6	3	2	3	3	2	2	1	–	2	2	3	2	2	2



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Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓
SDG-11: Sustainable Cities & Communities	-	✓	✓	✓	✓	✓
SDG-13: Climate Action	-	-	✓	✓	✓	✓

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	March, 2026
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	March, 2027



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	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSE01001
Course Title:	Fundamentals of Internet Technology
Course Group:	Discipline Specific Elective – I (DSE – I)
Course Objectives: • Understand the fundamentals of computer hardware, operating systems, and networking concepts. • Apply basic installation, configuration, and troubleshooting techniques for operating systems and network components. • Analyze internet technologies, networking devices, wireless communication, and modern connectivity solutions. • Evaluate and implement concepts of IoT, mobile computing, and basic network security in real-world environments.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* J: Jury; V: Viva; P:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Computer Hardware Fundamentals • Overview of Computer Components • Input, Output, and Storage Devices • CPU, RAM, ROM, Motherboard • Types of Storage (HDD, SSD, Optical, USB) • Power Supply and Cooling Systems • Ports and Interfaces (USB, HDMI, VGA, Ethernet, Audio)	10



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2	Operating System Installation & Configuration • BIOS/UEFI • Boot Process • Installation and Configuration of Operating Systems • OS Installation (Windows and Linux basics)	10
3	Networking Fundamentals • Basic Networking Concepts • LAN, WAN, MAN, PAN, Internet, Intranet • Transmission Media ◦ Wired Media (Coaxial, Twisted Pair, Fiber Optic) ◦ Wireless Media (IEEE 802.11 a/b/g/n standards) ◦ Connectors (RJ-45, RJ-11, BNC, Fiber connectors)	10
4	Networking Devices & Security • Networking Devices ◦ Switch (Layer 2 Switch, Layer 3 Switch) ◦ Router ◦ Hub ◦ Modem ◦ Access Point ◦ Bridge • Introduction to Network Security ◦ Firewalls ◦ Antivirus ◦ Secure Configuration Basics	10
5	Telecommunications & Internet Connectivity • Internet Technologies • ISPs, Broadband, Fiber, DSL, Satellite • Wireless Technologies • Wi-Fi Standards (802.11 a/b/g/n/ac/ax) • Hotspot Creation and Management • Mobile Networks (3G, 4G, 5G) • Wi-Fi Devices (Adapters, Range Extenders, Access Point)	10
6	Mobile Devices & IoT • Introduction to IoT • Architecture & Applications • IoT Devices and Communication • Smart Devices (Home, Wearables, Appliances) • IoT Connectivity (Zigbee, Bluetooth, MQTT) • Mobile Devices Overview • Security and Privacy in IoT	10



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Reference Books:

- 1 "Computer Fundamentals"- P.K. Sinha, Priti Sinha-BPB Publications
- 2 "Networking All-in-One For Dummies"-: Doug Lowe-: Wiley

Supplementary learning Material:

- 1 Online Tool – PCPartPicker - <https://pcpartpicker.com>
- 2 Free eBook – Operating System Concepts Essentials - <https://os-book.com>
- 3 IoT Simulator Tool – Cisco Packet Tracer (IoT Mode)

Pedagogy:

- Justify all the topics unit-wise
- Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	40	20	20	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Understand the components of a computer system.	16
SLO-2	Demonstrate the ability to install and configure basic operating systems.	17
SLO-3	Explain the fundamental concepts of networking, IP addressing, protocols, and networking devices.	17
SLO-4	Analyze various internet technologies, mobile networks, and wireless communication standards.	16
SLO-5	Understand the architecture of IoT systems and connected environments.	17
SLO-6	Demonstrate the usage of mobile and smart devices in a connected environment.	17



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Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 – High, 2 – Moderate, 1 – Low, – No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	1	–	1	–	–	–	–	1	2	1	–	–	–
SLO-2	3	2	–	2	–	2	–	–	2	2	2	–	–	–
SLO-3	3	2	1	2	–	2	–	–	2	2	2	1	–	–
SLO-4	3	3	2	3	–	2	–	–	2	2	3	2	–	–
SLO-5	2	2	3	2	1	2	–	–	2	2	2	2	1	1
SLO-6	2	2	3	2	1	2	–	–	3	2	2	2	1	1

Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓
SDG-11: Sustainable Cities & Communities	–	✓	✓	✓	✓	✓
SDG-13: Climate Action	–	–	✓	✓	✓	✓

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	March, 2026
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Next Review on (Month-Year):	March, 2027



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	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSE01002
Course Title:	Fundamentals of Operating Systems
Course Group:	Discipline Specific Elective – II (DSE – II)
Course Objectives: • Understand fundamental concepts of operating systems including processes, scheduling, and system structures. • Analyze process synchronization, inter-process communication, and CPU scheduling algorithms. • Apply memory management techniques, virtual memory concepts, and deadlock handling mechanisms. • Implement and evaluate operating system functionalities using Windows and Linux environments, including basic system administration and shell scripting.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* J: Jury; V: Viva; P:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to Operating Systems & Processes • Introduction of Process • Process Scheduling • Operations on Process • Cooperating Processes • Process Life Cycle & States	10
2	Process Synchronization & CPU Scheduling • Process Synchronization • Inter-process Communication • Communication in Client-Server Systems	10



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	• Introduction to Threads • Multithreading Models • CPU Scheduling Concepts • Scheduling Criteria & Algorithms	
3	Memory Management Basics • Concept of Memory Management • Basic Memory Management Techniques • Swapping • Demand Paging • Virtual Memory • Paging & Segmentation	10
4	Advanced Memory Management & Deadlocks • Page Replacement Algorithms (FIFO, Optimal) • Memory Allocation • Critical Section Problem • Deadlock & Characterization • Deadlock Prevention & Handling • Resource Allocation Graph • Banker's Algorithm	10
5	Windows Operating System • Introduction to Windows • Versions of Windows • OS Administrator • File System (Files, Folders, Drives) • Registry • Disk Formatting & OS Installation • Domain & Workgroup • Active Directory • User Management • Network Settings • Services • IIS Configuration • Web Browsers	10
6	Linux Operating System & Shell Programming • Introduction to Linux • Features of Linux • Basic Commands (login, logout, pwd, ls, etc.) • Wildcards • File Access Permissions (chmod) • File Commands (cat, cp, mv, rm, etc.) • Redirection, grep, sort, find • Shell Scripting	10



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	○ Variables ○ expr, test ○ Control Structures (if, case) ○ Loops (while, for)	
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Reference Books:

1	Andrew S. Tanenbaum, "Modern Operating Systems", 3rd Edition, PHI
2	Stalling William, "Operating Systems", 6th Edition, Pearson Education
3	Silberschatz A., Galvin P., Gagne G., "Operating System Concepts", 8th Edition, John Wiley and Sons
4	Milan Milenkovic, "Operating Systems Concepts and Design", TMGH
5	Das Sumitabha, "Unix Concepts and Applications", 3rd Edition, Tata McGraw Hill, 2003
6	M. J. Bach, "The Design of The Unix Operating System", PHI
7	Charles Crowley, "Operating Systems: A Design-oriented Approach", TMH

Supplementary learning Material:

1	Intro to Operating Systems 2: Memory Management https://www.coursera.org/learn/codio-intro-to-operating-systems-2-memory-management#syllabus
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Pedagogy:

- Justify all the topics unit-wise
- Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	40	20	20	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Illustrate the basics of operating systems and analyze process life cycle and state transitions.	16
SLO-2	Analyze process scheduling algorithms, synchronization, and inter-process communication.	17
SLO-3	Apply memory management techniques including paging, segmentation, and virtual memory.	17
SLO-4	Analyze deadlock conditions and apply techniques for deadlock prevention and handling.	16



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SLO-5	Demonstrate working knowledge of Windows operating system and its administration.	17
SLO-6	<i>Implement basic Linux commands and shell scripting for system operations.</i>	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 – High, 2 – Moderate, 1 – Low, – No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	2	–	2	–	–	–	–	1	2	2	–	–	–
SLO-2	3	3	–	3	–	2	–	–	1	2	2	1	–	–
SLO-3	3	2	2	3	–	2	–	–	2	2	3	2	–	–
SLO-4	3	3	2	3	1	2	–	–	2	2	3	2	1	1
SLO-5	2	2	2	2	2	2	–	–	2	2	2	1	2	–
SLO-6	2	2	2	2	1	2	–	–	2	2	2	1	1	–

Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓
SDG-11: Sustainable Cities & Communities	–	–	✓	✓	✓	✓
SDG-13: Climate Action	–	–	–	✓	✓	✓

Curriculum Revision:

Version:	1
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Aegis: Charutar Vidya Mandal (Estd.1945)

	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSC01004
Course Title:	Practical Based on Ethical Hacking Essentials
Course Group:	Discipline Specific Core- I (DSC- I)
Course Objectives: • Apply HTML and CSS concepts to create well-structured and visually appealing web pages using appropriate tags, elements, and styling techniques. • Design and develop responsive and user-friendly web interfaces by effectively using HTML elements, CSS properties, and layout techniques. • Develop web forms and client-side components using HTML5 features and apply CSS for validation, styling, and presentation. • Implement and create interactive web pages using basic JavaScript concepts for input handling, control flow, and dynamic content generation.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
--	--	4	3	--	--	25/10	50/20	75/30

* J: Jury; V: Viva; P:Practical

List of Practicals / Tutorials:

1	Perform practicals on identifying various hacker classes and phases of the Hacking Cycle.
2	Execute practicals on identifying threat sources and classifying different types of malware.
3	Perform practicals on vulnerability assessment using industry-standard tools.
4	Execute practicals on demonstrating social engineering techniques, including phishing and pretexting.
5	Perform practicals on identifying risks associated with insider threats and identity theft.
6	Execute practicals on password cracking techniques and tools.
7	Perform practicals on implementing countermeasures against social engineering and password-based attacks.
8	Execute practicals on packet sniffing concepts and techniques using appropriate tools.
9	Perform practicals on analyzing and implementing countermeasures for DoS/DDoS attacks.
10	Execute practicals on wireless network terminology, encryption, and specific attack techniques.
11	Perform practicals on Bluetooth attacks and wireless attack countermeasures.
12	Execute practicals on analyzing mobile device security and Mobile Device Management (MDM).



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13	Perform practicals on identifying IoT concepts, threats, and security countermeasures.
14	Execute practicals on understanding Operational Technology (OT) concepts and security practices.
15	Perform practicals on identifying various hacker classes and phases of the Hacking Cycle.
16	Execute practicals on identifying threat sources and classifying different types of malware.
17	Perform practicals on vulnerability assessment using industry-standard tools.
18	Execute practicals on demonstrating social engineering techniques, including phishing and pretexting.

Reference Books:

1	The Web Application Hacker's Handbook, Dafydd Stuttard and Marcus Pinto
2	Hacking: The Art of Exploitation, Jon Erickson
3	Penetration Testing: A Hands-On Introduction to Hacking, Georgia Weidman
4	Gray Hat Hacking: The Ethical Hacker's Handbook, Allen Harper et al.
5	The Hacker Playbook: Practical Guide to Penetration Testing, Peter Kim
6	Real-World Bug Hunting: A Field Guide to Web Hacking, Peter Yaworski
7	The Web Application Hacker's Handbook, Dafydd Stuttard and Marcus Pinto

Supplementary learning Material:

1	Online Cybersecurity Training Platform	Cybrary (https://www.cybrary.it)
2	Network Protocol Analyzer Tool	Wireshark (https://www.wireshark.org)
3	Web Application Security Resource	OWASP (https://owasp.org)

Pedagogy:

- Hands-on lab practice and exercises
- Continuous assessment through journal and assignments
- Mini project for practical implementation
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	10	40	25	10	15	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



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Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Understand ethical hacking principles, methodologies, and legal considerations.	16
SLO-2	Apply ethical hacking tools and techniques to identify vulnerabilities and mitigate security risks.	17
SLO-3	Understand and analyze social engineering techniques and password attacks.	17
SLO-4	Implement countermeasures to mitigate social engineering and password-based attacks.	16
SLO-5	Analyze network, wireless, and cloud security threats and apply appropriate countermeasures.	17
SLO-6	Analyze and mitigate security risks in mobile devices, IoT systems, and operational technology.	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 - High, 2 - Moderate, 1 - Low, - No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	2	-	2	3	-	-	2	1	2	2	-	3	-
SLO-2	3	3	2	3	2	2	1	3	2	2	3	3	2	1
SLO-3	2	3	-	2	2	-	-	3	2	1	2	2	2	-
SLO-4	2	3	-	3	3	2	-	3	2	1	3	2	3	-
SLO-5	3	3	3	3	2	3	2	3	2	2	3	3	2	1
SLO-6	3	3	3	3	2	2	2	3	2	2	3	3	2	2

Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓

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Aegis: Charutar Vidya Mandal (Estd.1945)

	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSC01005
Course Title:	Practical Based on Introduction to RDBMS
Course Group:	Discipline Specific Core- II (DSC-II)
Course Objectives: • Apply SQL commands using MySQL Workbench to create databases, tables, and perform data manipulation and retrieval operations. • Design and implement normalized database schemas and execute SQL queries involving joins, subqueries, and schema modifications. • Develop and execute stored procedures, functions, triggers, and perform database optimization and backup operations. • Manage database users, security configurations, and build a complete database application using advanced SQL techniques and best practices.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
--	--	6	3	--	--	25/10	50/20	75/30

* J: Jury; V: Viva; P:Practical

List of Practicals / Tutorials:

1	Perform practicals to create a database and define tables using appropriate data types and constraints.
2	Execute practicals for table creation and modification using SQL commands.
3	Perform practicals on basic SQL queries such as SELECT, INSERT, UPDATE, and DELETE.
4	Execute practicals to understand and apply different data types in MySQL.
5	Perform practicals on filtering and sorting data using WHERE, ORDER BY, and related clauses.
6	Execute practicals on normalization techniques and establish relationships between tables.
7	Perform practicals on advanced SQL queries including joins and subqueries.
8	Execute practicals on managing database structure using ALTER and other schema modification commands.
9	Perform practicals to create and execute stored procedures.
10	Execute practicals to create and use functions in MySQL.



11	Perform practicals on implementing triggers for database operations.
12	Execute practicals to apply database optimization techniques.
13	Perform practicals on backup and recovery of databases.
14	Execute practicals on user management including creation and configuration of users.
15	Perform practicals on assigning and managing permissions using GRANT and REVOKE commands.

Reference Books:

1	Learning MySQL - Seyed M.M. Tahaghoghi, Hugh E. Williams - Publisher: O'Reilly Media
2	Database System Concepts (7th Edition) - Abraham Silberschatz, Henry Korth, S. Sudarshan -McGraw-Hill
3	"Learning MySQL" by Seyed Tahaghoghi and Hugh Williams <i>Publisher: O'Reilly Media</i>
4	"MySQL: The Complete Reference" by Vikram Vaswani <i>Publisher: McGraw-Hill Education</i>
5	"MySQLTutorial" by Luke Welling and Laura Thomson <i>Publisher: Addison-Wesley Professional</i>

Supplementary learning Material:

1	MySQL Workbench Documentation for reference.
2	W3Schools MySQL Tutorial for SQL basics and examples.
3	MySQL Official Documentation for deeper insights into advanced topics.

Pedagogy:

- Hands-on lab practice and exercises
- Continuous assessment through journal and assignments
- Mini project for practical implementation
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
0	10	40	25	10	15	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Execute SQL commands using MySQL Workbench for database creation and management.	16
SLO-2	Apply SQL operations for data manipulation and retrieval using SELECT, INSERT, UPDATE, and DELETE queries.	17



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SLO-3	Design and implement normalized database schemas using keys, relationships, and constraints.	17
SLO-4	Execute advanced SQL queries including joins, subqueries, and schema modifications.	16
SLO-5	Develop and execute stored procedures, functions, triggers, and perform optimization and backup operations.	17
SLO-6	Manage database users, security configurations, and develop a complete database application using best practices.	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 – High, 2 – Moderate, 1 – Low, – No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	1	–	2	–	2	–	–	1	2	2	–	–	–
SLO-2	3	2	–	3	–	2	–	–	2	2	3	1	–	–
SLO-3	3	2	–	3	–	2	–	–	2	2	3	1	–	–
SLO-4	3	3	1	3	–	2	–	–	2	2	3	2	–	–
SLO-5	3	2	2	3	1	3	–	–	2	2	3	2	1	1
SLO-6	3	2	2	3	3	2	–	–	3	2	3	2	3	1

Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓

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Aegis: Charutar Vidya Mandal (Estd.1945)

	FACULTY OF SCIENCE
	Effective from Academic Batch:2026-27
Programme:	Master of Science (Cyber Security)
Semester:	I
Course Code:	2MCSS01001
Course Title:	Practical Based on Programming with HTML & CSS
Course Group:	Skill Enhancement Core- I (SEC-I)
Course Objectives: • Apply HTML and CSS concepts to create well-structured and visually appealing web pages using appropriate tags, elements, and styling techniques. • Design and develop responsive and user-friendly web interfaces by effectively using HTML elements, CSS properties, and layout techniques. • Develop web forms and client-side components using HTML5 features and apply CSS for validation, styling, and presentation. • Implement and create interactive web pages using basic JavaScript concepts for input handling, control flow, and dynamic content generation.	

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
--	--	4	2	--	--	25/10	25/10	50/20

* J: Jury; V: Viva; P:Practical

List of Practicals / Tutorials:

1	Perform practicals on basic formatting of web pages using HTML tags.
2	Execute practicals to create and manage ordered, unordered, and nested lists in HTML.
3	Perform practicals to insert and manipulate images in web pages using HTML.
4	Execute practicals to create hyperlinks for navigation between web pages.
5	Perform practicals to design and format tables in HTML.
6	Execute practicals on creating web pages using frames and framesets.
7	Perform practicals to design and implement HTML forms for data input.
8	Execute practicals on applying basic CSS styling using font, text, color, and background properties.
9	Perform practicals on styling borders and controlling margins and spacing using CSS.
10	Execute practicals on using class and ID selectors for styling web elements.
11	Perform practicals on CSS properties related to lists, box model, layers, and columns.
12	Execute practicals on positioning elements using CSS positioning techniques.



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13	Perform practicals on using basic JavaScript operators.
14	Execute practicals on reading user input and displaying output using JavaScript.
15	Perform practicals on implementing flow control statements in JavaScript.
16	Execute practicals on arrays and user-defined functions in JavaScript.
17	Perform practicals on using built-in JavaScript objects, their properties, and methods.
18	Execute practicals on HTML5 form controls and validation features.

Reference Books:

1	Kogent Learning Solutions Inc. HTML 5 in simple steps Dreamtech Press
2	A beginner's guide to HTML NCSA, 14th May, 2003
3	Lynchburg Creating a Web Page and Web Site College Murray, Tom /, 2002
4	Wilton P., Jeremy McPeak: Beginning JavaScript, 4th Ed., Wiley Pub.
5	Danny Goodman, Machael Morrison: "JavaScript Bible", 6th Ed., Wiley Pub.
6	Beginning CSS: Cascading Style Sheets for Web Design Wiley India
7	Kogent Learning Web Technologies: HTML, Javascript Wiley India

Supplementary learning Material:

1	Manuals of suitable packages / Online resources
2	World Wide Web Consortium – HTML 5.2 Specifications Link: https://html.spec.whatwg.org/
3	World Wide Web Consortium – HTML & CSS Link: https://www.w3.org/standards/webdesign/htmlcss
4	SWAYAM Portal: swayam.gov.in – HTML
5	https://onlinecourses.swayam2.ac.in/aic20_sp11/preview
6	e-Pg Pathshala: https://epgp.inflibnet.ac.in/ - HTML https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7

Pedagogy:

- Hands-on lab practice and exercises
- Continuous assessment through journal and assignments
- Mini project for practical implementation
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
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Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



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Aegis: Charutar Vidya Mandal (Estd.1945)

Student Learning Outcomes (SLO):

Sr.	Student Learning Outcome Statements	%weightage
SLO-1	Create structured web pages using HTML elements and components.	16
SLO-2	Design and develop web pages using HTML elements such as lists, tables, images, and hyperlinks.	17
SLO-3	Develop web forms using HTML5 controls for data input and validation.	17
SLO-4	Apply CSS properties for styling web pages, including layout, positioning, and visual design.	16
SLO-5	Implement basic scripting using JavaScript for input processing and flow control.	17
SLO-6	Develop interactive web pages using JavaScript features such as arrays, functions, and built-in objects.	17

Student Learning Outcome (SLOs) Mapping to POs/PSOs

3 – High, 2 – Moderate, 1 – Low, – No Correlation

SLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4
SLO-1	3	1	–	2	–	2	–	–	1	2	2	–	–	–
SLO-2	3	2	–	3	–	2	–	–	2	2	3	1	–	–
SLO-3	3	2	–	3	–	2	–	–	2	2	3	1	–	–
SLO-4	3	2	1	3	–	2	–	–	2	2	3	2	–	–
SLO-5	3	2	2	3	1	2	–	–	2	2	3	2	1	1
SLO-6	3	2	2	3	1	2	–	–	3	2	3	2	1	1

Mapping of Student Learning Outcomes (SLOs) with SDGs

SDGs ↓ / SLOs →	SLO-1	SLO-2	SLO-3	SLO-4	SLO-5	SLO-6
SDG-4: Quality Education	✓	✓	✓	✓	✓	✓
SDG-8: Decent Work & Economic Growth	✓	✓	✓	✓	✓	✓
SDG-9: Industry, Innovation & Infrastructure	✓	✓	✓	✓	✓	✓

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