Master of Science - Cyber Security
Programme Structure and Detailed Curriculum / Syllabus
Programme Structure

Sub Code	Subject Name	Credit	
		Theory	Practical
Semester – I			
MSCCS-101	Principles of Cyber Security	4	
MSCCS-102	Fundamental of Computer Networking	4	
MSCCS-103	Cyber Security Techniques	4	
MSCCS-104	Computational Number Theory and Cryptography	4	
MSCCS-105	Software Lab for MSCCS-103, MSCCS-104		2
		16	
Semester – II			
MSCCS-201	Web Development Tools	4	
MSCCS-202	Cloud Infrastructure and Services	4	
MSCCS-203	Application and Network Security	4	
MSCCS-204	Cyber Attacks and Counter Measures: User Perspective	4	
MSCCS-205	Software Lab for MSCCS-201, MSCCS-203		2
		16	
Semester – III			
MSCCS-301	Mobile Operating System and Security	4	
MSCCS-302	Information Security Assurance: Framework, Standards and Industry best practices	4	
MSCCS-303	Digital / Computer Forensics	4	
MSCCS-304	Security Analysis and Reporting	4	
MSCCS-305	Software Lab for MSCCS-303, MSCCS-304		2
		16	
Semester – IV			
MSCCS-401	Hacking Techniques	4	
MSCCS-402	Cyberspace and Its Governance	4	
MSCCS-403	Software Lab for MSCCS-401		2
MSCCS-404	Cyber Security - Case Study/Dissertation		8
		08	10

Course Wise detailed Curriculum / Syllabus

Course Name: Principals of Cyber Security
Course Code: MSCCS-101

Block	Detail syllabus
Block-1	**Introduction to Cyber Security**
	• Introduction, Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control and Cryptography. • Web attack: Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks. • Network Vulnerabilities: Overview of vulnerability scanning, Open Port / Service Identification, Banner /Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. • Networks Vulnerability Scanning (Netcat, Socat), Network Sniffers and Injection tools.
Block-2	**Network Defense tools**
	• Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding. • VPN: the basic of Virtual Private Networks. • Firewall: Introduction, Linux Firewall, Windows Firewall. • Snort: Introduction Detection System.
Block-3	**Web Application Tools**
	• Scanning for web vulnerabilities tools: Nikto, W3af, • HTTP utilities - Curl, OpenSSL and Stunnel. • Application Inspection tools – Zed Attack Proxy, Sqlmap, DVWA, Webgoat. • Password Cracking and Brute-Force Tools: John the Ripper, L0htcrack, Pwdump, HTC-Hydra.
Block-4	**Introduction to Cyber Crime, law and Investigation**
	• Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world. • Internet crime and Act: A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT

	2000. • Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

Course Name: Fundamental of Computer Networking
Course Code: MSCCS-102

Block	Detail syllabus
Block-1	**Introduction of Computer Network**
	• Introduction to Networking, Components of Networking, Different Computing Models of Network, Centralized, Distributed, Collaborative, Networking Configuration Client/Server Based, Peer To Peer Networking, Local and Wide Area Network. • Intranets and Internets Network Services, FileServices, File Transfer Services, Printing Services, Application Services. • Fundamentals of communication theory, Analog and Digital Signal, Periodic aperiodic signal, Peak Amplitude, bit rate, frequency, Decibel, bit Interval, Transmission Impairment, Attenuation, Distortion, Noise, thermal, Induced, cross talk, Impulse Noise • Throughput, Propagation Speed, waveforms, bandwidth.
Block-2	**Networking Standards**
	• Introduction to Standards, Standard Organization and the OSI rules and the Communication Process. • The OSI reference Model, How Peer OSI Layer Communicates, Protocol Stacks. • Conceptualizing the layers of the OSI Model, OSI physical layer, OSI Data Link Layer, Concepts of OSI Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer. • IEEE802 family standard.
Block-3	**Transmission Media & TCP/IP**
	• Introduction to Transmission Media, Characteristics, Cost, Installation, Requirements, Bandwidth Band Usage, Attenuation and Electromagnetic Interference. • Cable Media Coaxial Cable, Twisted-Pair Cable, Fiber Optic Cable, Summary of Cable. • Wireless Media, Reason for wireless Network, Wireless Communication with LANs, Comparison of Different Wireless Media, Time Division Multiplexing (TDM), Time Division Multiple Access (TDMA). • TCP/IP: TCP/IP and internetworking, related protocols, ports and sockets, The IP address structure, IP datagram.
Block-4	**Connectivity Devices, Network Topologies and architectures**

	• Connectivity Devices: Introduction to Modems, Asynchronous Transmission, Synchronous Transmission, Network Adapter card, Repeaters Hubs Passive, Active, Intelligent, Bridges, Routers, Brouters, Gateways, Routing Algorithms, Distance Vector Routing, Link State Routing. • Network architectures: Introduction to Access Methods, Contention Polling, Token Passing, Comparing Contention and Token Passing, Demand Priority. • Topologies: Network Topologies, Bus Topologies, Ring Topologies and Star Topologies, Mesh Topology. • Switching & Routing In Networks: Message Switching, Packet switching when and when not to use packet switching, packet routing, and packet switching support to circuit switching.

Course Name: Cyber Security Techniques
Course Code: MSCCS-103

Block	Detail syllabus
Block-1	• Introduction to cyber security • Cybercrime and different modes of attacks • Intrusion detection system
Block-2	• It assets and wireless security • Cyber security assurance framework • Desktop security and malware
Block-3	• E-commerce and web-application security • Social engineering • Cyber security risk management
Block-4	• Computer forensics fundamentals and collection of digital evidence • Cyber security initiatives in India • Cyber security strategies and policies

Course Name: Computational Number Theory and Cryptography
Course Code: MSCCS-104

Block	Detail syllabus
Block-1	• Computational Complexity • GCD Computation • Finite Groups
Block-2	• Modular Arithmetic • Key Exchange • Public Key Cryptosystem
Block-3	• Factorization • Primarily Testing • Elliptic Curve Cryptosystem
Block-4	• Hash Function Digital Signatures • Stream Ciphers

Course Name: Web Development Tools
Course Code: MSCCS-201

Unit	Detail syllabus
Unit-1	**.NET architecture and Programming**
	• Components of the .NET Architecture MS .NET Runtime, Managed / Unmanaged Code, Intermediate Language, Common Type System, MS .NET Base Class Library (BCL), Assemblies, • Metadata, and Modules, Just In Time Compilation, Garbage Collection. • Introduction to C# .Net language, C# Program Console Application Development, Compiling and Executing, Defining a Class, Declaring the Main () Method, Organizing Libraries with Namespaces, Using the using Keyword, Adding Comments. • C# Data Types, Value Types-Primitive Data Types, Reference Types.
Unit-2	**C# Controls structure , Properties, Delegates & Exception Handling**
	• C# Control Structures -Using the if Statement, Using the if- else Statement, Using the switch case Statement, C# looping controls and jumping statements: Using the for Statement, Using the while Statement, Using the do while Statement, Using the break Statement, Using the continue Statement, Using the return Statement, Using the goto Statement. • C# Properties – Using Properties- Get Accessor, Set Accessor. • Delegates in C# - Single Cast, Multicast Delegates. • Exception Handling in C# -Using the try Block, Using the catch Block, Using the finally Block, Using the throw Statement.
Unit-3	**Inheritance, interface and generics**
	• Inheritance, in C#. • Interfaces in C#. • Structures in C# • Operator Overloading in C#, Using Generics in C#.
Unit-4	**Threading , file handling, C# controls**
	• Multithreading -Getting started with threads, managing thread lifetimes, destroying threads, scheduling threads, communicating data to a thread. • File I/O with streams - Stream classes file stream, streamreader and streamwriter, string readers and writers file system classes directory and directoryinfo, file and fileinfo, parsing paths. • C# Windows form and Controls -General Controls with important properties, events and Methods (Label, text box, button, listbox, combo box, check box, radio button picture box, date time pickerprogress bar, timer. Status strip, user defined controls). • Containers (Groupbox, panel, split container, tab control, tab layout

	panel, flow layout panel),Menu and Tools Bars, Menu strip, context menu strip, status strip, tool strip, Dialogs (Color dialog, folder browser dialog, font dialog, open file dialog, save file dialog).
Reference Books	
(1)	Beginning C#, Wrox Publication.
(2)	Professional C#, Wrox Publication.

Course Name: Cloud Infrastructure and Services
Course Code: MSCCS-202

Block	Detail syllabus
Block-1	**Introduction to cloud computing**
	• Introduction, Cloud and other similar configuration. • Cloud v/s Other Architecture: cloud computing versus peer to peer architecture, cloud computing versus client server architecture, cloud computing versus grid computing, server virtualization versus cloud computing. • Cloud computing in a nutshell, system models for distributed and cloud computing, roots of cloud computing, layers and types of clouds, desired features of a cloud, basic principles of cloud computing, challenges and risks, service models. • Cloud types and models – private cloud, components of private cloud, implementation phase of a private cloud, pro and cons of private cloud, public cloud and hybrid cloud.
Block-2	**Cloud computing services**
	• Infrastructure as a Service (IaaS), Platform as a Service (PaaS) • Software as a Service (SaaS), Database as a Service (DaaS). • Security as a Service. • Specialized cloud services.
Block-3	**Application architecture for cloud and Cloud deployment techniques**
	• Introductions, Cloud application requirement, architecture for traditional versus cloud application, assumption for traditional and cloud applications. • Recommendations & fundamental requirement for cloud application architecture, SOA for cloud applications, parallelization within cloud applications. • Factors for a successful cloud implementation, cloud network topologies, automation for cloud deployment, self-service feature in a cloud deployment, federated cloud deployment, cloud performance- monitoring and tuning, impact of memory on cloud performance. • Improving cloud database performance and cloud services brokerage.
Block-4	**Risks ,Security in cloud, consequences and costs of cloud computing** • Risk in cloud computing, risk assessment and management, risk of vendor lock-in, loss of control, risk of resource scarcity / poor provisioning, risk in multi-tenant+ environment, risk of

	failure risk of malware and internet attacks, risk of management of cloud resource risk of network outages, risk of physical infrastructure legal risk, risk with software and application licensing. • Data security in the cloud - data redundancy, data recovery, data backup data replication, data residency or location, data reliability, data fragmentation, data integration, data transformation, data migration, data confidentiality & encryption, key protection, data availability, data integrity, cloud data management interface, cloud storage gateways and its advantages, cloud firewall, virtual firewall. • Application security in the cloud – Cloud application software lifecycle, application security in an IaaS, PaaS and SaaS environment and its protection. • TCO for cloud computing, direct and indirect cloud cost, cost allocations in a cloud, chargeback models for allocation of direct and indirect cost, chargeback methodology, billable items, maintaining strategic flexibility in a cloud.

Course Name: Application and Network Security
Course Code: MSCCS-203

Block	Detail syllabus
Block-1	• Desktop Security • Programming Bugs and Malicious Codes • Database Security • Operating System Security
Block-2	• Disaster Recovery • Digital Signature • Ethical Hacking, Penetration Testing • Computer Forensics
Block-3	• ISO 27001, cyber law and it act-2000 • international standards for cyber sec • security audit and investigation • cyber security solutions
Block-4	• E-mail secirity • web application security • web browser security • e-commerce security
Block-5	• Wireless network security • security issues in wireless networks • securing a wireless network • mobile device security

Course Name: Cyber Attacks and Counter Measures: User Perspective
Course Code: MSCCS-204

Block	Detail syllabus
Block-1	• Cyber attacks, types of attacks motivation • Asset, threat and risk management • Oraganization security & frameworks • Information security governance
Block-2	• Security controls • Security control design • Software development life cycle (sdlc)
Block-3	• Authentication and password security • Wireless security • Investigation and digital forensic • Introduction to cryptography

Course Name: Mobile Operating System and Security
Course Code: MSCCS-301

Block	Detail syllabus
Block-1	• Generalize Operating System • Functionality Of Generalize Operating System • Operating System Structures • Mobile Computing
Block-2	• Mobile Devices • Function Of Mobile Operating System • Mobile Operating System • Generalized Mobile Operating System Architecture and Comparison
Block-3	• Basics of Android Operating System • Internal Mechanism of Android OS • ios Operating System
Block-4	• Windows Phone • Blackberry • Symbain

Course Name: Information Security Assurance: Framework, Standards and Industry best practices
Course Code: MSCCS-302

Block	Detail syllabus
Block-1	• Information security standards • Information security regulations • Industry best practices • Industry best practices
Block-2	• Managing information security • Information security management system - iso standards • ISO/IEC 27001 and 27002 for information security management system (isms) • Information security management system (isms) auditing
Block-3	• Security audit • Information security • Disaster recovery • Business continuity planning and management

Course Name: Digital / Computer Forensics
Course Code: MSCCS-303

Block	Detail syllabus
Block-1	• Introduction to digital forensic • Computer forensics investigation process • Digital evidence and first responder procedure • Understanding storage media and file system
Block-2	• Windows forensics • Logs & event analysis and password cracking • Network forensics • Wireless attacks
Block-3	• Investigating web attacks • Investigating email attacks • Mobile device forensics • Investigative reports, expert witness and cyber regulations

Course Name: Security Analysis and Reporting
Course Code: MSCCS-304

Block	Detail syllabus
Block-1	• Packet Analysis & Risk Management • Wireless Network Analysis • Intrusion Detection & Prevention System • Cyber Crime. IT Assets and Wireless Security
Block-2	• Malware Analysis • Email Security Analysis • Vulnerability Assessment and Penetration Testing (VPAT) • Social Engineering
Block-3	• Cyber Security Incident Management • Handling an Incident • Coordination and Information Sharing • Containment, Eradication and Recovery

Course Name: Hacking Techniques
Course Code: MSCCS-401

Block	Detail syllabus
Block-1	• Overview of Hacking • Footprinting & Reconnaissance • System Hacking • Sniffers
Block-2	• Trojans, Backdoors, Viruses and Worms • Session Hijacking • Social Engineering • Denial of Service
Block-3	• Web Application Hacking • SQL Injection • Hacking Wireless Networks • IDS, Firewalls and Honeypots

Course Name: Cyberspace and Its Governance
Course Code: MSCCS-402

Block	Detail syllabus
Block-1	• Cyberspace – An Overview of the Concept • Inherent Characteristics of Cyberspace • Forms of Cyberspace Regulations • Cyberspace Regulatory Theory of Lawrence Lessig
Block-2	• Outline of Legislative Framework for Cyber Law • History and Emergence of Cyber Law • Outreach and Impact of Cyber Law • Major Amendments in Various Statutes
Block-3	• Establishment of Personal Jurisdiction in Cyberspace • Overview of Tests and Interactivity • Jurisdictional Approaches of Online Contract • Basis of Jurisdiction and Indian Approach
Block-4	• Indian Constitution and Freedom of Expression • Examination of Rights Under Indian Laws • The Legislative Responses in Cyberspace • National Sovereignty And Freedom Of Expression

Course Name: Cyber Security - Case Study/Dissertation
Course Code: MSCCS-404

1. Basic Information

Semester	Course Code	Course Name	CP	TYPE
IV	MSCCS-404	Cyber Security - Case Study/Dissertation	8	PR

Project Guidelines

A. Cyber Security - Case Study/Dissertation Guide Eligibility Criteria:

Full Time Faculties in the Department of Computer Science/ Information Technology of BAOU/ Colleges/ Institutions affiliated to any Indian University recognized by UGC and having minimum 2 years teaching experience.

OR

A person having minimum M. Tech, MCA, M.Sc. in Computer Science/Information Technology from a UGC recognized universities with 4 years' experience in Industry/teaching.

B. Type of Project

Learner may choose any topics according to Master of Science - Cyber Security standards. Most of the project work falls under the following types

a. Database oriented
b. Application oriented
c. R & D project

C. Cyber Security - Case Study/Dissertation Proposal (Synopsis)

The Cyber Security - Case Study/Dissertation proposal or the synopsis is the frame work for carrying out the project. It should be prepared in consultation with Guide. The necessary parts of a project proposal are given in the following form:

- Title of the Cyber Security - Case Study/Dissertation.
- Introduction and Objectives of the Project.
- Project Category.
- Whether the project is done for any Industry/Client? The Name and Address of the Industry or Client is to be mentioned.
- Methodology
- Expected output
- Conclusion

D. Application Areas & Related Tools

A list of selected area for developing the project work is given below:

Applications:

Financial/ Manufacturing/ Multimedia/ Computer Graphics/ Instructional Design/ Database Management System/ Internet/ Intranet/ Computer Networking-Communication Software/ E-Commerce/ TCP/IP Internals/ Routing protocols/ Implementation of Switches & Routers/ Image processing,/ Mobile apps development etc..

Cyber Security - Case Study/Dissertation Report Guideline

The Cyber Security - Case Study/Dissertation report should prepared in well-structured preferably typed in Latex. Depending on the type of project the report should be as follows:

Acknowledgement
Content with page number
Declaration Certificate
Certificate from Guide
Chapters
References
Appendix (if any)

Certificate of Originality from the Guide

This is to certify that the project report entitled .....……
……submitted to **Dr. Babasaheb Ambedkar Open University** in partial fulfillment of the requirement for the award of the degree of **Master of Science – Cyber Security,** is an original work carried out by Mr./ Ms. ..... Enrolment No.: ..... under the supervision of Mr./Mr./Ms.……..
The matter embodied in this project is a genuine work done by the learner and has not been submitted either to this University or to any other University / Institute for the fulfillment of the requirement of any course of study.

Signature of the Learner
Name
Address
Enrolment No.:

Signature of the Guide
Name
Designation
Address

Seal of Learner Support Centre

Format of the Cyber Security - Case Study/Dissertation Report

A Cyber Security - Case Study/Dissertation Report on

Title of the Case Study/Dissertation

In fulfillment of the requirement for the 6th Semester of
Master of Science in Cyber Security
Programme

Submitted by

.....

(Name of the Learner)

Enrollment No.: .....

Session: .....

Under the Guidance of

.....

(Name of the Guide)

Learner Support Centre

.....

(Name of the Learner Support Centre)

.....

(Location)