

Uttarakhand Residential University Almora



Bachelor of Science (Cyber Security)



Uttarakhand Residential University

Almora, Uttarakhand-263001

Study & Evaluation Scheme

SUMMARY

Programme	:	B.Sc. (Cyber Security)
Duration	:	Three Years (Six Semesters)
Medium	:	English
Minimum Required Attendance	:	75%
Credit	:	
Maximum Credit	:	
Minimum Credit required for the degree	:	
Assessment		

Internal	External	Total
25	75	100

Evaluation of Practical/Dissertations & Project Reports

External	Internal	Total
50		50

Duration of Examination

External	Internal
3 hrs	1 ½ hrs

To qualify the course a student is required to secure a minimum of 40 marks in aggregate including the semester end examination and teachers continuous evaluation (i.e. both internal & external). A candidate who secures less than 40% of marks in theory and practical papers separately in semester, shall be deemed to have failed in that semester.

Question Paper Structure:

Semester where Class room teaching is taking place in University

1. The question paper shall consist question one as compulsory of 15 marks. In addition there will be two questions from each unit of which one question will have to be answered by the student. Each question will carry equal weightage.

Semester where Class room teaching is taking place in University

1. The question paper shall consist question of Multiple choice Questions and the same would take place using computer software in a manner that the result would be known to the student at the end of the paper.

SEMESTER # 1

- 1.Computer Fundamentals and Software Hardware
- 2.HTML with CSS3
- 3.Programming Concepts with C Language
- 4.Professional and confident communication

Paper 1- (Computer Fundamentals and Software Hardware)

Unit 1- Introduction to computer Introduction, Evolution, Generations, Classification and it's application_Block diagram of computer, CPU, ALU, CU, Computer memory: Primary and Secondary, Input/ Output Devices.

Unit 2 - Introduction to Operating System

Definition and functions of an Operating System,Types of Operating System.

MS DOS Operating System

Introduction to DOS, System Files of DOS, Concept of Booting, Files and Directory Structure, Concept of path, Internal and External commands, Batch files.

Unit 3- Microsoft Word

Starting MS-Word, Document window and its Components, Different Bars, Document View, Creating a new Document,Saving a document,

Opening an existing document,Working with Text,paragraph,Bullets and Numbering,Find and Replace,copy,cut and paste,spelling and grammer checking,undo and redo option,Header and Footer ,page setup,printing Documents,inserting Picture, Working with Tables.

Unit 4 – Microsoft Excel

Starting MS-Excel, working with Toolbars,Row,Columns and cell, working with Excel: Creating a new Workbook,Working with Cells and Fonts ,Merging Cells , Inserting AND Deleting Rows and Columns, Saving A workbook, Closing a workbook.

Different Operators used in Excel,Woring with Formula and Functions, Sorting Data, Working with Charts.

Unit 5- Microsoft PowerPoint

Starting MS-PowerPoint,Creating a new Presentation ,Working with slides, Applying Text AND Graphics, A pplying Themes ,Customizing Slide Show, Saving, running AND Closing a Presentation,Opening an Existing Presentation.

Paper 2- HTML WITH CSS3

- **An Introduction to html**

Structure of an HTML Document, HTML Tags, html elements, Horizontal line, Body Attributes, Additional Text Formatting, benefits of HTML, Limitation of HTML.

- **Lists , Hyperlinks and Tables in Web Pages**

Introduction

Adding Image

Lists

Hyperlinks and Anchors

Tables

- **CSS3**

- Introduction- what is css3, The history of css3, Browser Support, HTML 5.

- **Selectors and pseudo Classes**

- Attribute Selectors

- The Target Pseudo –class

- **Fonts and Texts Effects**

- Fonts on web

- Font Services

- Text Shadow

- Word Wrapping

- **Colors, Background Images**

- Colour

- The opacity property

- Backgrounds

- **Borders and Box Effects**

- Image Borders

- ROUNDED Corners

- Box Shadow

Web page development- Introduction, web page, Web site, basics of a web page and web site design.

Internet – Introduction and related content.

Paper 3- Programming Concepts with C Language

Overview of c

History of c language, features of C Language, what is c language.

Constants , Variables and Data types

Data types- Integers, long and short in C Language with practical

Integers, signed and unsigned in C Language with practical

Char, signed and unsigned in C Language with practical

Floats and Doubles in C Language with practical

Constants in C with practical

Variables in C with practical

Keywords in C with practical

How to get input from user with practical

How to display output to user with practical

Operator s and expressions in c

Unary operators , assignment operators ,arithmetic operators, Increment and decrement operators ,Relational operators ,Logical operators ,Conditional operators,

Control structures and decision making and branching loops

Exploring the syntax of a control structure, working with conditional statements-if, if-else ,nested if ,switch statement.

Working with iterative statements- while Loop, do-while Loop, for Loop.

Arrays

Introducing Arrays ,Types of Arrays- One –Dimensional Arrays ,Two dimensional Arrays , Limitations of Arrays.

Functions

Function definition, types of functions-Built-in functions, user-defined function, parameter passing mechanism ,functions and variables.

Structures and Unions

Defining a structure , declaring structure variables ,declaring Initializing Structure variables, Defining a union. declaring and initializing union variables.

Paper 4- Professional and confident communication

UNIT I: The Seven C's of the Effective Communication

1. Completeness
2. Conciseness
3. Consideration
4. Concreteness
5. Clarity
6. Courtesy
7. Correctness

UNIT II: Communication: Its interpretation

1. Basics
2. Nonverbal Communication
3. Barriers to Communication

UNIT III: Business Communication at Work Place

1. Letter Components and Layouts
2. Planning a letter
3. Process of Letter writing
4. Email Communication
5. Memo and Memo Reports
6. Employment Communication
7. Notice Agenda and Minutes of Meeting
8. Brochures

UNIT IV: Report Writing

1. Effective Writing
2. Types of Business Reports
3. Structure of Reports
4. Gathering Information
5. Organization of the Material
6. Writing Abstracts and Summaries
7. Writing Definitions
8. Visual Aids
9. User Instruction Manual

UNIT V: Required Skills

1. Reading Skills
2. Note-making
3. Précis Writing
4. Audio Visual Aids
5. Oral Communication

SEMESTER # 2

Paper	Title	Features of the course
Paper I	Introduction to Hardware, Software, Data & Programming Languages	Students will be able to understand the concepts of Hardware and Software which will comprise of Important Components of Hardware and Software, Basic Components of Data, Importance of Data and overview of different Programming Languages.
Paper II	System Development Life Cycle, Business Logic and Flow Charts	Students will get the complete understanding of system (software) development life cycle along with requirement gathering tools and roles of different experts required to complete SDLC life cycle.
Paper III	Introduction to E-Communication, Social Media and Importance, ECommerce & Business, IoT, Cloud Computing and Cyber Security	We are leaving in an integrated and digital world where communication, e-commerce and social media along with advance technologies like IoT, Cloud Computing and Cyber Security plays a critical role for efficient and profitable management of any business. In this Paper students will get the background and fundamentals of how all these technologies are implemented on ground and how they are going to impact the future.
Paper IV	Introduction to Artificial Intelligence, Machine & Deep Learning, Big data, Business Intelligence and Analytics, Business Continuity Planning (BCP)	In this Paper student will get a good understanding of latest emerging technologies like Artificial Intelligence, Machine & Deep Learning, Big data, Business Intelligence and Analytics along with use cases (how implemented on ground). Concept of Business Continuity Planning will also make part of the paper.

Paper – I

- Introduction to Computer Hardware and Software
 - o Types of Computers
 - o Hardware components
 - o Main Parts of Computer and their Usage
 - o Software Components
- Introduction to Operating System
 - o MS-DOS Overview & Commands
 - o Introduction to Unix based Operating System's
- Basic Concept of Programs & Programming Languages
 - o History of Programming Language
 - o Different Programming Languages and their usages
- Introduction to Data & Information
 - o Processed and Unprocessed Data
 - o Importance of Data & Information

- o Data Processing Software and Tools

Paper – II

- Fundamental of Business Logic & Applications (Bespoke Developed)
- Web and Application processing software and tools
- System Development Life Cycle (SDLC)
 - o What is System Development Life Cycle (SDLC)?
 - o Different System Development Life Cycle (SDLC) Models and their Importance
- Fundamentals and Importance of Flowchart
 - o What is a Flowchart?
 - o Importance of Flowchart during SDLC.
 - o Flow Chart Symbols
 - o Data Flow, Workflow & Process Flow Chart
- Role of Architecture, Business Analyst, Developers, Testers & Support Engineers in SDLC

Paper – III

- Fundamentals of E-Communications (Electronic Communications)
- Introduction to Social Media Platform and their importance in IT sector
- Introduction to E-Commerce and E-Business
 - o What is Business?
 - o Importance of Business
 - o E-Commerce & Business Production Life Cycle
 - o Introduction to Supply Chain Management
- Traditional Computing & Cloud Computing
- What is Internet of Things?
 - o What is M2M & M2H Communication?
- What is Security and Cyber Security?
 - o Consequences of Data & Information Breach
 - o Introduction to Authentication & Authorization
 - o Introduction to viruses, Antivirus & and infected PCs
 - o Recent Cyber Security breaches

Paper – IV

- Basic Concepts of Artificial Intelligence, Machine Learning and Deep Learning
 - o Difference Between Machine Learning & Deep Learning
 - o Use Cases of Artificial Intelligence and Machine Learning
- Basic Concepts of Big Data
 - o Difference between Data and Big Data
 - o How it works & Major Components of Big Data
 - o Use cases of Big Data
- Basic Concepts of Business Intelligence & Analytics
 - o Difference Between Business Intelligence & Analytics
 - o Different Business Intelligence & Analytics Tools and Software
 - o Use cases of Business Intelligence & Analytics
- Introduction to Business Continuity Planning

SEMESTER # 3

TITLE		Features of the course
01	Programming Concepts and Application Architecture	Programming Concepts, Introduction to High Availability, Application & Web Servers and Database, Application Architecture, Introduction to Compute (Servers, Storage, CPU, Cores, RAM etc), Data Center & Disaster Recover
02	Database Management System	Introduction to Databases, RDBMS, Relational Model, Relational Database design and Normalization, Introduction to SQL, Working with relations of RDBMS, Concept of Transaction, Database Administrators and Database Users, Basics of Data Warehousing, Concepts of Functions, Triggers and Procedures
03	Introduction to Open Source Operating System, Networking and Virtualization	Introduction to Operating System (Linux) & Commands, Basics of Communication & Networking, Introduction to Virtualization
04	Cloud Computing, Open Source, IOT and Cyber Security	Introduction to Cloud Computing (Amazon, MS Azure), Introduction to Open Source Concept & Technologies, Introduction to IoT and Cyber Security
PRACTICAL		
01	Practical	Installation of Virtualization Software, Installation of Open Source Linux/Ubuntu Operating Systems, Web & Application Servers (Apache, Tomcat, Jboss etc), Configuration & Performance Tunings, Installation & Configuration of Database (Oracle, MySQL, Postgre SQL, Maria DB etc.)

Paper I : _Programming Concepts and Application Architecture

- Programming Concepts
 - What is a program
 - Program Structure
 - Variable Declaration
 - Operators
 - Conditional Statements (IF. THEN.ELSE)
 - Iterative Constructs (Loops)
 - OOPS Concepts
- Introduction to High Availability
 - Load Balancing
 - Clustering
 - Failover
- Introduction to Application & Web Servers and Database
- Application Architecture
- Introduction to Compute (Servers, Storage, CPU, Cores, RAM etc)
- Introduction to Data Center & Disaster Recover

Paper II: Database Management System

- Introduction to Databases
 - What is Database Management System
 - Purpose of database system
 - Advantages and Disadvantages of Database System
 - Database architecture
- Introduction to RDBMS
- The Relational Model
- Relational Database design and Normalization
- Introduction to SQL
 - DDL, DML, DCL and TCL
 - Queries and Sub queries
 - Data Types
 - Operators
 - Aggregate functions
- Working with relations of RDBMS
- Concept of Transaction
- Database Administrators and Database Users
- Basics of Data Warehousing
- Concepts of Functions, Triggers and Procedures

Paper III : Introduction to Open Source Operating System, Networking and Virtualization

- Introduction to Operating System (Linux) & Commands
 - Introduction to Linux operating system
 - Introduction to Bash Shell
 - Basic Commands
 - Text editor (vi)
 - Working with packages
 - User Administration

- File system concepts & security
- Processes and jobs
- Introduction to Shell Scrip
- Basics of Communication & Networking
 - An Introduction to Networking
 - Networking Types and Structures
 - Intranet and Internet
 - The OSI Model Layers
 - Networking Levels and Layers and Protocols
 - Network Hubs, Switches and Routers
 - An introduction to DNS
- Introduction to Virtualization
 - An introduction to Virtualization
 - Virtualization Architecture
 - Types of virtualization
 - Advantage & Disadvantage
 - Virtualization Software

Paper IV : Cloud Computing, Open Source, IOT and Cyber Security

Open Source

- Introduction to Open Source Concept & Technologies
 - An introduction to Open Source
 - Open Source and Proprietary Software
 - Advantages and disadvantages of the open source software
 - Roles of Open Source & Proprietary Software in Government and Private Sector
 - Indian Government Policy About Open Source

Cloud Computing

Introduction to Cloud Computing (Amazon, MS Azure)

- Introduction to Cloud Computing including benefits, challenges, and risks
- Cloud Computing Models
- Infrastructure as a Service
- Platform as a Service
- Software as a Service
- Public, private and hybrid clouds

LAB

- Installation of Virtualization Software
- Installation of Open Source Linux/Ubuntu Operating Systems
 - Working with Linux/Ubuntu
- Installation of Web & Application Servers (Apache, Tomcat, Jboss etc)
 - Working with Web & Application Server
- Integration Between Web & Application Servers
- Configuration & Performance Tunings
- Installation & Configuration of Database (Oracle, MySQL, Postgre SQL, Maria DB etc.)
- Working with Database

SEMESTER # 4 (CS)

TITLE		Features of the course
1	Programming in Java	Introduction of Java. Data Types ,variables and Arrays , operators ,control statements ,Classes and Methods, Inheritance ,packages and Interfaces ,Exception Handling. Applets, Introduction of AWT , Frames.
2	Advance Database Programming	PL/SQL Programming, Triggers, Functions, Procedures ,Cursors ,locks.
3	Cryptography and Network Security	Basic concepts and implementation methodologies of - Cryptography & Cryptosystems, Characteristics, Context, Security Services, Symmetric and Asymmetric Key Encryption and Services.
4	Cyber Security Principles, Vulnerabilities and Securing Web Applications	Security principle, Managing data, Prepare to be hacked , Vulnerability, Exploit, Threat, Different Path for Hackers, Plan, Protect, Comply & Educate, Common Computer Security Vulnerabilities, Internal Network Security, Safeguarding Against Cyber security Threats, Communication with SSL/TLS
PRACTICAL		
01	Practical Securing Web Application, Services and Servers with SSL	SSL certificate configurations

UNIT I: Programming in Java

UNIT II: Advance Database Programming

- PL/SQL Programming
- Triggers
- Functions
- Procedures

UNIT II: Cryptography and Network Security

- History of Cryptography
- Cryptosystems
- Context of Cryptography
- Characteristics of Modern Cryptography
- Security Services of Cryptography
- Symmetric and Asymmetric Key Encryption and Services

UNIT III: Cyber Security Principles, Vulnerabilities and Securing Web Applications

- Security principles
- Managing data
- Prepare to be hacked
- What Is a Vulnerability?
- What Is an Exploit?
- What Is a Threat?
- Different Path for Hackers
- Plan, Protect, Comply & Educate
- Common Computer Security Vulnerabilities
- Internal Network Security
- Safeguarding Against Cyber security Threats
- Communication with SSL/TLS

LAB

Self-sign and third party SSL certificate configurations

SEMESTER # 5 (CS)

Paper	Detail	
01	Advanced Java Concepts	Packages & Interfaces, Multithreading, I/O Applets and Other topics, Collections Framework, Java Database Connectivity, JDBC-ODBC, Java Networking, AWT Controls, Layout Managers, Java Beans, Swings, Java Servlets, Struts
02	Introduction to VS.Net (Building Windows based Application with Win Forms)	Introduction to VS.Net, Working with Win Forms, Win Form Controls, Error Handling in Win Form, Exceptions, MDI Applications & Connectivity with Database
03	Building Web Applications with ASP.Net	Introduction, Environment Setup, Life Cycle, Event Handling, Server Controls, HTML Server. Basic Controls, Directives, Validators, Database Access, ADO.net, AJAX Controls, Data Binding, Custom Controls, Error Handling, Debugging, Security, Web Services, Multithreading, Configuration, Deployment
04	Cyber Security Concepts on the basis of Meta Sploit Framework	Absolute Basics of Penetration Testing, Metasploit Basics, Intelligence Gathering , Vulnerability Scanning, Meterpreter, Exploitation using Client-Side Attacks, Metasploit Auxiliary Modules, Social Engineering Toolkit, Karmetasploit, Building your own Module, Creating your own Exploits, Porting exploits to MSF, Meterpreter Scripting
Practical		
01	Programming in Java, VS.Net, ASP.Net , Raspberry Pi (IoT) & MetaSploit Framework (Cyber Security)	

Paper 1) Advanced Java Concepts

Paper 2) Introduction to VS.Net (Building Windows based Applications with Win Forms)

Paper 3) Introduction to Web Applications with ASP.Net

Paper 4) Cyber Security Concepts on the basis of Meta Sploit Framework