# Computer Science

**Grades: 11 and 12**          **Subject code:** Com. 427 **(Grade 11),**  Com. 428 **(Grade 12)**

**Credit hrs: 5**          **Working hrs: 160**

## 1.    Introduction

The world has witnessed a radical change in the field of Information and Communication Technology (ICT) in recent and this process is still going on. The relevance of computer education has been increasing day by day. Realizing the same the curriculum of computer science for Grades 11 and 12 has been developed according to the National Curriculum Framework, 2076. The study of this course will help the students to enter the job market. This will also provide basis for the students to pursue their further study in the field.

This curriculum comprises of an introduction to basic computer system, the basic number system and Boolean logic, computer software and operating system, application package, multimedia and network. It also includes contents of web technology, programming, information security and cyber law, digital society and computer ethics and recent trends in ICT. The course itself is of practical nature and the pedagogical approaches in delivering the course should consider the balance between theory and practice. The same applies in case of student evaluation procedure too.

The curriculum has been divided to different sections: level-wise competences, grade-wise learning outcomes, scope and sequence of contents with their elaboration, some indication to learning facilitation process and student assessment.

## 2.    Level-wise competencies

1.    Relate principles of computer system including input, process, output and storage devices, Boolean logic and number system.

2.    Use operating system, word processor, spread sheet and apply in real-life and educational contexts.

3.    Design website using new web technologies.

4.    Demonstrate the programming concept and logic into software development process.

5.    Use Database concept in basic SQL level.

6.    Apply networking concept into LAN and wireless network.

7.    Define OOPs concept and trace the recent trends of technological enhancement in 21$^{st}$ century.

## 3.   Grade wise learning Outcomes

**Grade 11**

| S. N. | Content Area | Learning outcomes |
|-------|--------------|-------------------|
| 1 | Computer system | 1.1   Introduce computer with its characteristics and application. |
| | | 1.2   Describe the evolution of computer. |
| | | 1.3   Describe the measurement unit of processing speed and storage unit and use them. |
| | | 1.4   Introduce Super, Mainframe, Mini and Microcomputers and compare them. |
| | | 1.5   Introduce mobile computing and its application and use it. |
| | | 1.6   Sketch and describe computer architecture and organization. |
| | | 1.7   Identify and explain the components of computer system. |
| | | 1.8   Introduce and explain microprocessor and bus system. |
| | | 1.9   Introduce and explain primary and secondary memory. |
| | | 1.10 Identify and use input and output devices. |
| | | 1.11 Describe hardware interfaces and use them. |
| 2 | Number System and Conversion Boolean Logic | 2.1   Introduce the number system, Decimal-Binary-Octal-Hexadecimal conversion and binary calculation. |
| | | 2.2   Introduce the Boolean Algebra, Boolean values and truth table, Boolean expression and Boolean function. |
| | | 2.3   Introduce and explain Logic Gates. |
| | | 2.4   Describe Laws of Boolean Algebra. |
| 3 | Computer Software and Operating System | 3.1   Explain software with its categories. |
| | | 3.2   State the concept of operating system with its functions and etymologies. |
| | | 3.3   Describe GUI based operating system and its features. |
| | | 3.4   Introduce desktop application and windows environment. |
| | | 3.5   Create file and folders with file explorer. |
| | | 3.6   Customize the start screen and desktop. |
| | | 3.7   Install and remove the devices. |
| | | 3.8   Manage password and privacy. |
| | | 3.9   Use control panel, system tools and accessories |
| | | 3.10 State the concept of open sources and mobile operating system. |

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| | | 3.11 Introduce Linux, UNIX and Linux distribution. |
| | | 3.12 Explain the types of mobile operating system. |
| 4 | Application Package | 4.1 Describe the office package (Word, Processor, Spreadsheet and Presentation) and apply them. |
| | | 4.2 Introduce the domain-specific tools. |
| 5 | Programming Concepts & Logics | 5.1 Introduce the programming language and identify its levels. |
| | | 5.2 Introduce and compare Compiler, Interpreter and Assembler. |
| | | 5.3 Introduce Syntax, Semantic and Runtime errors and apply them. |
| | | 5.4 Introduce control structures and use them. |
| | | 5.5 Identify programme design tools and use them. |
| | | 5.6 Describe absolute binary, BCD, ASCII and Unicode. |
| | | 5.7 State the features and structure of C language. |
| | | 5.8 Introduce C preprocessor and header files and use them. |
| | | 5.9 Introduce character set and apply it. |
| | | 5.10 Explain the Identifiers, Keywords and Tokens. |
| | | 5.11 Introduce and explain the basic data types. |
| | | 5.12 Introduce constants, variables, operators and expressions and apply them. |
| | | 5.13 Identify the types of specifier and apply them. |
| | | 5.14 Identify the simple and compound statements and apply them. |
| | | 5.15 Introduce Input/output (I/O) functions. |
| | | 5.16 Introduce Selection Control Statement and Iteration Control Statement. |
| | | 5.17 Describe array and string functions and apply them. |
| 6 | Web Technology I | 6.1 Explore web browsers and search engines. |
| | | 6.2 Overview internet and web technology. |
| | | 6.3 Explain and use Content Management System (CMS). |
| | | 6.4 Describe with objectives and structure of HTML. |
| | | 6.5 Differentiate between tags and attributes. |
| | | 6.6 Describe and use the types of tags in HTML. |
| | | 6.7 Introduce Cascading Style Sheet (CSS), describe its types and use them. |
| 7 | Multimedia | 7.1 Introduce and apply multimedia. |

| | | 7.2 | Describe the components of multimedia. |
|---|---|---|---|
| 8 | Information Security and Cyber Law | 8.1 | Describe digital society and computer ethics. |
| | | 8.2 | State the concept of information security and cybercrime. |
| | | 8.3 | Explore and apply the protective measures of cybercrime. |
| | | 8.4 | Identify key aspects intellectual property right and follow it. |
| | | 8.5 | State the concept of digital signature and use it. |
| | | 8.6 | Analyze cyber law and ICT policy in Nepal |

**Grade 12**

| S. N. | Content Area | | Learning outcomes |
|---|---|---|---|
| 1 | DBMS Concept | 1.1 | Introduce Database Management System (DBMS) with its aspects. |
| | | 1.2 | State the advantages of using DBMS. |
| | | 1.3 | Define Data Definition Language (DDL) and Data Manipulation Language (DML). |
| | | 1.4 | Introduce and use database model. |
| | | 1.5 | State the concept of normalization. |
| | | 1.6 | Compare between centralized and distributed database. |
| | | 1.7 | Introduce database security and apply it. |
| 2 | Concept of Network and Data Communication | 2.1 | Describe the communication system with its basic elements and model. |
| | | 2.2 | Describe the data communication with its elements and mode. |
| | | 2.3 | Define and apply LAN and WAN. |
| | | 2.4 | Describe transmission medium and use it. |
| | | 2.5 | Define terminologies for transmission impairments. |
| | | 2.6 | Introduce network architecture. |
| | | 2.7 | Define basic terms and tools used in computer network. |
| | | 2.8 | Define network tools, devices and topologies and use them. |
| | | 2.9 | State the concept of OSI Reference Model and Internet Protocol Addressing |
| 3 | Web Technology II (CSS, JavaScript, PHP) | 3.1 | Introduce internet technology. |
| | | 3.2 | Introduce Server side and Client Side Scripting. |

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| | | 3.3 | Introduce and use java script fundamental and java script data types and add java script to HTML page. |
| | | 3.4 | Introduce and use variables and operators in java script. |
| | | 3.5 | Use functions and control structure in java script. |
| | | 3.6 | Apply object based programming with java script and event handling. |
| | | 3.7 | Introduce basic programming concept in PHP. |
| | | 3.8 | Use operators and variables in PHP. |
| | | 3.9 | Introduce and use data base connectivity. |
| | | 3.10 | Use SQL queries and create SQL database. |
| 4 | Programming II | 4.1 | Review the concept of C programming. |
| | | 4.2 | Introduce functions with prototype, call and return statements. |
| | | 4.3 | State the concept of library and user defined functions and their advantages. |
| | | 4.4 | State the concept of storage and recursion and apply them. |
| | | 4.5 | Introduce and differentiate between structure and union. |
| | | 4.6 | Define pointers and apply them. |
| | | 4.7 | State the concept of data file with sequential and random file. |
| | | 4.8 | Apply the file manipulation function. |
| | | 4.9 | Open, read, write and append the data file. |
| 5 | OOP Concept | 5.1 | Introduce object Oriented Programming (OOP) with programming paradigms and features. |
| | | 5.2 | State advantages and applications of OOP. |
| 6 | Software Process Model (SDLC, Software Process only) | 6.1 | State the concept of software project, software development process and SDLC. |
| | | 6.2 | Compare between system analyst and software engineer. |
| | | 6.3 | State the concept of system design. |
| | | 6.4 | Show the relation between software and quality. |
| | | 6.5 | Explain the software development model. |
| 7 | Recent Trends in ICT | 7.1 | Describe the recent trends in ICT |

## 4.    Scope and Sequence of Contents

**Grade 11**

| S. N. | Content Area | Elaboration of Contents | Working Hour |
|---|---|---|---|
| 1 | Computer system | 1.1 Introduction of computer<br><br>    1.1.1 Definition, characteristics and application of computer<br><br>    1.1.2 Evolution of computer technology<br><br>    1.1.3 Measurement unit of processing speed and storage unit<br><br>    1.1.4 Super, Mainframe, Mini and Microcomputers<br><br>    1.1.5 Mobile Computing and its Application<br><br>1.2 Computer system and I/O devices<br><br>    1.2.1 Concept of computer architecture and organization<br><br>    1.2.2 Components of computer system: input unit, output unit, processing unit, memory unit and storage<br><br>    1.2.3 Microprocessor: basic concepts, clock speed, word length, components and functions<br><br>    1.2.4 Bus System: data bus, address bus and control bus<br><br>    1.2.5 Primary memory: Definition, RAM, ROM, Cache, Buffer, types of RAM and ROM<br><br>    1.2.6 Secondary Memory: Definition, Magnetic Disk, Flash Memory, Optical Disk, External Storage Device and memo stick<br><br>    1.2.7 Input Devices – Keyboard, Mouse, Scanner, Light Pen, OMR, OCR, BCR, MICR, Scanner, Touch Screen, Microphone and Digital Camera.<br><br>    1.2.8 Output Devices: Monitor (LCD, LED), Printer (Dot Matrix, Inkjet, Laser), Speaker<br><br>    1.2.9  Hardware Interfaces: Parallel Port, Serial Port, USB Ports, HDMI and Expansion Slots | 20 |

| 2 | Number system and conservation Boolean Logic | 2.1 Number System and conversion<br><br>    2.1.1 Decimal, Binary, Octal, Hexadecimal Number System & conversion<br><br>    2.1.2 Calculation in binary addition, subtraction<br><br>    2.1.3 One's and Two's complement methods of binary subtraction<br><br>2.2   Logic Function and Boolean Algebra<br><br>    2.2.1 Introduction to Boolean algebra<br><br>    2.2.2 Introduction to Boolean values, truth table, Boolean expression and Boolean function.<br><br>    2.2.3 Logic Gates –AND, OR, NOT, NAND, NOR, XOR and XNOR – its definition, truth table, logic symbol, logic function<br><br>    2.2.4 Laws of Boolean algebra – Boolean identities, Complement Laws, Identity, Commutative, Associative and Distributive<br><br>    2.2.5 Statement and verification of Laws of Boolean algebra using truth table | 11 |
| 3 | Computer Software and Operating System | 3.1 Concept of Software<br><br>    3.1.1 Definition of software<br><br>    3.1.2 Categories of software: System, Utility, Application, Web Based, Mobile Apps<br><br>3.2 Concept of Operating System<br><br>    3.2.1   Introduction to Operating System<br><br>    3.2.2   Role of Operating System<br><br>    3.2.3   Functions of an Operating System<br><br>    3.2.4   Operating system terminology: multiprogramming, multitasking, multiprocessing and distributed<br><br>3.3 Windows Operating System<br><br>    3.3.1   Introduction to GUI based Operating system and its features<br><br>    3.3.2   Working in Desktop Application and Window Environment<br><br>    3.3.3   Manage Files and Folders with File Explorer<br><br>    3.3.4   Customize the start screen and desktop | 12 |

| | | 3.3.5 Installing and removing devices | |
|---|---|---|---|
| | | 3.3.6 Manage passwords and privacy levels | |
| | | 3.3.7 Use of control panel, system tools and accessories | |
| | | 3.4 Open sources and Mobile Operating System | |
| | | 3.4.1 Concept of Open Sources Operating System | |
| | | 3.4.2 Introduction to Linux and UNIX | |
| | | 3.4.3 Linux Distributions | |
| | | 3.4.4 Concept of Mobile Operating System | |
| | | 3.4.5 Types of Mobile Operating System | |
| 4 | Application Package | 4.1 Introduction to Office Package - Word processor, Presentation tool, spreadsheet package, database management system; <br><br> 4.2 Introduction to domain-specific tools - school management system, inventory management system, payroll system, financial accounting, hotel management, weather forecasting system. | 5 |
| 5 | Programming Concepts & Logics | 5.1 Programming Concept <br><br> 5.1.1 Introduction to programming languages <br><br> 5.1.2 Low level, High level, 4 GL programming languages <br><br> 5.1.3 Compiler, Interpreter and Assembler <br><br> 5.1.4 Syntax, Semantic and Runtime errors <br><br> 5.1.5 Control Structures: Sequence, Selection and Iteration <br><br> 5.1.6 Program Design tools – Algorithm, Flowchart and Pseudocode <br><br> 5.1.7 Absolute binary, BCD, ASCII and Unicode <br><br> 5.2 C Programming Languages <br><br> 5.2.1 Introduction and features of C Language <br><br> 5.2.2 Structure of C program <br><br> 5.2.3 C Preprocessor and Header Files <br><br> 5.2.4 Character Set used in C <br><br> 5.2.5 Use of Comments | 8 |

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|---|---|---|---|
| | | 5.2.6 Identifiers, Keywords and Tokens | |
| | | 5.2.7 Basic Data Types in C | |
| | | 5.2.8 Constants and Variables | |
| | | 5.2.9 Type of Specifier | |
| | | 5.2.10 Simple and Compound Statements | |
| | | 5.2.11 Operators and Expressions: arithmetic, relational, logical, assignment, unary and conditional operators | |
| | | 5.2.12 Input/output (I/O) Functions | |
| | | 5.2.13 Selection Control Statement: Decisions (if, if-else, if-else-if, nested and, switch) | |
| | | 5.2.14 Iteration Control Statement: Looping (while, do while, for nested) | |
| | | 5.2.15 Array: definition, types(1D and 2D), matrix addition and subtraction | |
| | | 5.2.16 String: definition and string function : strlen(), strcat(), strcmp(), strrev(), strcpy(), strlwr(), strupr() | |
| 6 | Web Technology I | 6.1 Introduction: Web development introduction | 8 |
| | | 6.2 Web browsers and search Engines | |
| | | 6.3 Overview of various internet & web technologies | |
| | | 6.4 Content Management System (CMS) | |
| | | 6.4. HTML: The Language of the Web | |
| | |     6.4.1 Objectives | |
| | |     6.4.2 Structure of HTML | |
| | |     6.4.3 Published and Hosting | |
| | |     6.4.4 HTML Tags vs. Attributes | |
| | |     6.4.5. Basic Tags of HTML: HTML, HEAD, TITLE, BODY (Setting the Fore color and Background color, Background Image, Background Sound) | |
| | |     6.4.6 Heading tag (H1 to H6) and attributes(ALIGN), | |
| | |     6.4.7 FONT tag and Attributes (Size: 1 to 7 Levels, BASEFONT, SMALL, BIG,COLOR) | |
| | |     6.4.8 Paragraph Formatting (P) | |
| | |     6.4.9 Break Line BR | |

| | | 6.4.10. Comment in HTML (<! >) | |
|---|---|---|---|
| | | 6.4.11. Formatting Text (B, I, U, Mark, Sup, Sub, EM, BLOCKQUOTE, PREFORMATTED) | |
| | | 6.4.12. Ordered List- OL (LI, Type- 1, I, A, a; START,VALUE) | |
| | | 6.4.13. Unordered List - UL (Bullet Type- Disc, Circle, Square, DL, DT, DD) | |
| | | 6.4.14 ADDRESS Tag | |
| | | • Creating Links: Link to other HTML documents or data objects | |
| | | • Links to other places in the same HTML documents | |
| | | • Links to places in other HTML documents | |
| | | • Anchor Tag and Hyperlink | |
| | | 6.4.15. Tables: Creating Tables using TH, TR and TD tags | |
| | | 6.4.16 Forms: Creating form using Textbox, radio, checkbox, text area, button | |
| | | 6.4.17 Introduction to HTML 5 Elements including audio, embed, source, track and video attributes | |
| | | 6.4.18 HTML 5 Graphics using canvas and svg tags | |
| | | 6.4.19 Concept of domain name and web hosting | |
| | | 6.5 Cascading Style Sheets | |
| | | 6.5.1 Introduction to Cascading Style Sheet (CSS) | |
| | | 6.5.2 Inline CSS | |
| | | 6.5.3 Embedded CSS | |
| | | 6.5.4 External CSS | |
| 7 | Multimedia | 7.1 Introduction to Multimedia | 6 |
| | | 7.2 Component of Multimedia: Text, Graphics, Audio, Video and Animation | |
| | | 7.3  Application of Multimedia | |
| 8 | Information Security and | 8.1 Digital society and computer ethics | 10 |

| S. N. | Content Area | Contents | Working Hour |
|---|---|---|---|
| | Cyber Law | 8.2 Concept of Information security | |
| | | 8.3 Concept of Cybercrime | |
| | | 8.4 Malicious software and Spam | |
| | | 8.5 Protection from cybercrime | |
| | | 8.6 Intellectual Property Right | |
| | | 8.7 Concept of Digital Signature | |
| | | 8.8 Concept of Cyber Law in Nepal | |
| | | 8.9 ICT Policy in Nepal | |
| **Total** | | | **80** |

### Grade 12

| S. N. | Content Area | Contents | Working Hour |
|---|---|---|---|
| 1 | Database Management System (DBMS) | 1.1 Introduction to data, database, Database system, DBMS | 12 |
| | | 1.2 Field, Record, Objects, Primary Key, Alternate key, Candidate key | |
| | | 1.3 Advantages of using DBMS | |
| | | 1.4 DDL (Data Definition Language) and DML (Data Manipulation Language) | |
| | | 1.5 Database Model: Network Model, Hierarchical Model, Relational database model | |
| | | 1.6 Concept of Normalization: 1NF, 2NF, 3NF | |
| | | 1.7 Centralized Vs. Distributed Database | |
| | | 1.8 Database Security | |
| 2 | Data Communication and Networking | 2.1 Basic elements of Communication System: | 15 |
| | | 2.2 Concept of Communication System | |
| | | 2.3 Block Diagram of communication System /Model | |
| | | 2.4 Elements of Data Communication/Transmission | |
| | | 2.5 Simplex, Half duplex and Full duplex communication mode | |
| | | 2.6 Concept of LAN and WAN | |
| | | 2.7 Transmission Medium: Guided and Unguided | |
| | | 2.8 Transmission impairments terminology (Jitter, Singing, Echo, Crosstalk, Distortion, Noise, Bandwidth, Number of receivers) | |

| | | 2.9 Basic concept of Networks Architecture: Client-Server and Peer-to-peer | |
|---|---|---|---|
| | | 2.10 Some Basic Terms and Tool Used in Computer Network: IP Address, Sub Net Mask and Gateway, MAC address, Internet, Intranet, Extranet | |
| | | 2.11 Network Tool: Packet tracer, Remote Login | |
| | | 2.12 Network Connecting Devices: NIC, Modem, router, switch | |
| | | 2.13 Network Topologies: Bus, Ring and star topology | |
| | | 2.14 Basic Concept OSI Reference Model | |
| | | 2.15 Internet Protocol Addressing | |
| 3 | Web Technology II | 3.1 Introduction | 12 |
| | | 3.2 Server side and Client Side Scripting | |
| | | 3.3 Introduction of internet technology | |
| | | 3.4 Adding Java script to HTML page | |
| | | 3.5 Java script fundamental | |
| | | 3.6 Java Script Data types | |
| | | 3.7 Variables and operators | |
| | | 3.8 Functions and control structure if-else, if-else-if, switch-case, for, while, do while loop | |
| | | 3.9 Object based programming with Java Script and Event handling | |
| | | 3.10 Image, event and form objects | |
| | | 3.11 Form validation, JQuery | |
| | | 3.12 Server Side Scripting using PHP | |
| | | 3.13 Introduction to PHP: Hardware and Software Requirements | |
| | | 3.14 Object oriented programming with server side scripting | |
| | | 3.15 Basic PHP syntax | |
| | | 3.16 PHP data types | |
| | | 3.17 Basic Programming in PHP | |
| | | 3.18 Operators (Arithmetic, logical, comparison, operator precedence) | |
| | | 3.19 Variables Manipulation | |
| | | 3.20 Database Connectivity | |

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|---|---|---|---|
| | | 3.21 Connecting server side script to database | |
| | | 3.22 Making SQL queries | |
| | | 3.23 Fetching data sets getting data about data | |
| | | 3.24 Creating SQL database with server side scripting | |
| | | 3.25 Displaying queries in tables | |
| 4 | Programming in C | 4.1 Review of C programming concept | 12 |
| | | 4.2 Functions | |
| | |    4.2.1   Concept of library and user defined functions and advantages | |
| | |    4.2.2   function definition, prototype, call and return statements | |
| | |    4.2.3   Accessing a Function by passing values | |
| | |    4.2.4   Concept of storage: automatic and external | |
| | |    4.2.5   Concept of Recursion: factorial and Fibonacci problems | |
| | | 4.3 Structures and Unions | |
| | |    4.3.1 Structure: Definition, Declaration, Initialization and Size of Structure. | |
| | |    4.3.2 Accessing member of structure | |
| | |    4.3.3 Array of structure | |
| | |    4.3.4 Union: Definition, Declaration | |
| | |    4.3.5 Difference between union and structure. | |
| | | 4.4 Pointers | |
| | |    4.4.1 Definition of Pointer | |
| | |    4.4.2 Address (&) and indirection (*) operator | |
| | |    4.4.3 Pointer Expression and Assignment | |
| | |    4.4.4 Call by values and call by reference | |
| | | 4.5 Working with Files | |
| | |    4.5.1 Concept of Data File | |
| | |    4.5.2 Sequential and Random File | |
| | |    4.5.3 File manipulation function: putw, getw, putc, getc, fscanf, fprintf | |
| | |    4.5.4  Opening, Reading, Writing and Appending data file | |
| 5 | Object-Oriented Programming | 5.1 Programming paradigms:  procedural, structural and object oriented | 10 |
| | | 5.2 Features of OOP: Class, Object, Polymorphism and | |

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|---|---|---|---|
| | (OOP) | Inheritance | |
| | | 5.3 Advantages of OOP | |
| | | 5.4  Application of OOP | |
| 6 | Software Process Model (SPM) | 6.1    Software Project Concept | 10 |
| | | 6.2    Concept of software development process | |
| | | 6.3    Concept SDLC life cycle | |
| | | 6.4    System Analyst Vs Software Engineer | |
| | | 6.5    Requirement Collection Methods | |
| | | 6.6    Concept of system design | |
| | | 6.7    Software and quality | |
| | | 6.8    Software development model: waterfall, prototype, agile | |
| 7 | Recent Trends in Technology | 7.1  Concept of Artificial Intelligence (AI) and Robotics | 9 |
| | | 7.2  Concept of Cloud Computing | |
| | | 7.3  Concept of Big Data | |
| | | 7.4  Concept of Virtual Reality | |
| | | 7.5  Concept of e-com, e-medicine, e-gov. | |
| | | 7.6  Concept of Mobile Computing | |
| | | **7.7** Concept of Internet of things (IoT) | |
| | | Total | 80 |

## 5.    Suggested Practical/Project Activities

### a) Suggested Practical

| Grade 11 | | | |
|---|---|---|---|
| **S. N.** | **Content Area** | **Tasks** | **Working Hour** |
| 1 | Number system and conservation Boolean Logic | Use Simulator : Demonstrate Logic Gates and its expression using simulator | 3 |
| 2 | Computer Software and operating system | With Window OS or Linux platform: Working in Desktop Application and Window Environment | 8 |

| | | | |
|---|---|---|---|
| | | • Manage files and folders with file explorer | |
| | | • Customize the start screen and desktop | |
| | | • Installing and removing devices | |
| | | • Manage passwords and privacy levels | |
| | | • Use of control panel, system tools and accessories | |
| 3 | Application package | Application Package (Word Processor, Spreadsheet and Presentation)<br><br>1.Word processor<br>• Basic terms of word processing<br>• Creating document and environment<br>• Formatting text and paragraphs<br>• Spelling grammar, thesaurus, comments<br>• Managing lists and tables<br>• Inserting graphic objects<br>• Controlling page appearance<br>• Performing a mail merge<br>• Preparing to publish a document<br>• Levels and table of contents<br>• Export documents: PDF<br><br>2. Spread Sheet<br>• Basic fundamentals of Spread Sheet<br>• Entering data, cell manage, concept of cell references<br>• Formatting a worksheet<br>• Creating and working with charts<br>• Managing workbooks<br>• General functions and formulas<br>• Data filter and sorting<br>• Pivot tables and pivot chart<br>• Working with other objects<br>• Printing worksheets<br><br>3. Presentation<br>• Basic fundamental of presentation<br>• Create presentation slides | 25 |

| S. N. | Content Area | Tasks | Working Hours |
|---|---|---|---|
| | | • Design and formatting presentation<br>• Animation and custom animation<br>• Transition of presentation<br>• Working with tables, graphics and word art<br>• Working with graphs and organization charts<br>• Working with multimedia | |
| 4 | Programming Concepts and Logics | Input/output (I/O) Functions<br>• Selection Control Statement: Decisions (if, if-else, if-else-if, nested and, switch)<br>• Iteration Control Statement: Looping (while, do while, for nested)<br>• Array: definition, types (1D and 2D), matrix addition and subtraction<br>• String: definition and string function : strlen(), strcat(), strcmp(), strrev(), strcpy(), strlwr(), strupr() | 14 |
| 5 | Web Technology | • Practices on HTML 4 using basic Tags of HTML, <H1> , <FONT>, <P>, <BR>, <!>, <OL>, <UL>, <A>, <img>, <table>, <form><br>• Practices on HTML 5 including audio, embed, source, track and video attributes, Graphics using canvas and svg tags<br>• Practice on cascading Style Sheets including Inline, Embedded, External CSS | 15 |
| 6 | Multimedia | • Graphics (Photo and image editing)<br>• Image capture, resize, crop, add layer, save in different format<br>• Audio recording, editing and save in different format using mobile<br>• Video recording, spilt, save in differ format | 15 |
| **Total** | | | **80** |
| **Grade 12** | | | |
| S. N. | Content Area | **Tasks** | **Working Hours** |
| 1 | DBMS | Perform the following activities in SQL | 25 |

| | Concept | 1. Install latest DBMS software (MySQL or PostgreSQL or MSSQL or Oracle) 2. Work with CREATE, DROP, ALTER DDL SQL statement 3. Work with SELECT, INSERT, UPDATE, DELETE DDL SQL statement | |
|---|---|---|---|
| 2 | Concept of network and data communication | Perform the following task 1. Demonstrate Ipconfig, ping 2. Construct twisted pair cable (Straight through and crossover) 3. Demonstrate the basic router Configuration (ADSL, DSL) 4. Demonstrate the server based OS (Windows Server or Linux) 5. Share file, folder and printer in network 6. Assign private IP Address in LAN network | 15 |
| 3 | Web Technology II | Perform the following task in Java script 1. Functions and control structure if-else, if-else-if, switch-case, for, while, do while loop 2. Event handling 3. Practice on form validation in JQuery Perform the following task in PHP 1. Server Side Scripting using PHP 2. Basic PHP syntax 3. PHP data types 4. Basic Programming in PHP 5. Operators (Arithmetic, logical, comparison, operator precedence) 6. Variables Manipulation 7. Database Connectivity 8. Making SQL queries 9. Fetching data sets getting data about data | 20 |
| 4 | Programming II | C Programming Languages 1. Factorial and Fibonacci problems 2. Array, Union and Structure 3. Pointers 4. File manipulation function: putw, getw, putc, getc, | 20 |

| | | | | |
|---|---|---|---|---|
| | | fscanf, fprintf | | |
| | | 5. Opening, Reading, Writing and Appending data file | | |
| **Total** | | | | **80** |

## b) Suggested project work

Grade-wise sample project works are suggested below.

**Grade 11**

1. Prepare basic computer system devices and peripheral specifications of your personal computer.

2. Write a report on "Major cyber bullying in Nepal" with real examples and suggest the preventing measures

3. Conduct a survey to identify the popular search engines (any 5) and its features.

4. Develop the real life project on Office Package or web technology

**Grade 12**

1. Study Wi-Fi network available in your area and identify the security features.

2. Prepare a document for data collection method to develop software

3. Conduct a mini research to identify most recently used technologies and uses.

## 6. Learning Facilitation Method and Process

Students should be facilitated to learn rather than just helping them to accumulate information.. Student centered teaching-learning process is highly emphasized in delivering this course. Students are supposed to adopt multiple pathway of learning such as; online search, field visit, library work, laboratory work, individual and group work, research work etc. with the support of teacher. Self-study is highly encouraged and learning should not be confined to the scope of curriculum. Teacher should keep in mind intra and inter-disciplinary approach to teaching and learning, as opposed to compartmentalization of knowledge. Supportive role of parents/guardians in creating conducive environment for promoting the spirit of inquiry and creativity in students' learning is anticipated. The following methods and techniques will be adopted in delivering this course.

- Practical/application/experimental methods

- Laboratory based practical works

- Project work methods (Research work i.e. survey and mini research, innovative work or experiential learning, connection to theory and application)

- Lecture

- Interaction

- Question answer

- Demonstrations

- Online based instructions

- Cooperative learning

- Group discussions (satellite learning group, peer group, small and large group)
- Daily assignment

## 7.    Student Evaluation

Evaluation is an integral part of learning process. Both formative and summative modes of evaluation are emphasized. Formative evaluation will be conducted so as to provide regular feedback for students. Class tests, unit tests, oral question-answer, home assignment etc., are some ways of conducting formative evaluation. There will be separate evaluation of theoretical and practical learning. Summative evaluation embraces internal evaluation including evaluation of project/research work or innovative work, theoretical examination and practical examination.

### a) Internal Evaluation

Internal evaluation is both formative and summative. For summative purpose it covers 25% of total weightage. Project work assessment is the internal assessment of reports and presentation of their project works either individually or group basis. In case of group presentation, every member of the group should submit a short reflection on the presented report in their own language. The criteria for internal evaluation are given in the table.

| S. N. | Criteria | Marks |
|---|---|---|
| 1 | Classroom participation (Daily attendance, home assignment and classwork, participation in learning, participation in other activities) | 3 |
| 2 | Trimester exam (3 marks from each trimester exam) | 6 |
| 3 | Project work, project report and presentation | 16 |
| | **Total** | **25** |

### b) External Evaluation

External evaluation covers 75 % of total weightage. External evaluation consists of both the practical and written examination. The practical examination carries 25% and written examination carries 50%. Practical examination will be conducted in the presence of examiners. Practical evaluation must cover all the practical course areas and the criteria for Practical evaluation are in the table given below.

| S.N. | Criteria | Marks |
|---|---|---|
| 1 | Writing process of given practical task | 5 |
| 2 | Demonstration of practical task | 15 |
| 3 | Viva voce | 5 |
| | Total | 25 |

The types and number questions for written examiniation will be as per the test specification chart developed by the Curriculum Development Centre.