Far western University

Mahendranagar, Kanchanpur

Faculty of Education

B. Ed in Computer Science and Information Technology

Course Structure
B.Ed. 1st Semester

Code	Group	Course Details	CR. Hr.
Major Subjects			
CS.Ed 101	Major 1	Fundamental of Computer and Information Systems	3

B Ed 2nd Semester

Code	Group	Course Details	CR. Hr.
Major Subjects			
CS.Ed.121	Major 1	Algorithm and Problem Solving Using C Programming	3
CS.Ed. 122.1	Major 2	Digital Logic	3

B Ed 3rd Semester

Code	Group	Course Details	CR. Hr.
Major Subjects (any two subject from one group)			
CS.Ed.231	Major 1	Data Structure and Algorithms	3
CS.Ed.232.2	Major 2	Object Oriented Programming with C++	3

B Ed 4th Semester

Code	Group	Course Details	CR. Hr.
Major Subjects			
CS.Ed.241	Major	Operating System	3
CS.Ed.242		System Analysis and Design	3
CS.Ed.243		Discrete Structure	3
CS.Ed244	Minor	Fundamental of Computer and Information Systems	3

B Ed 5th Semester

Code	Group	Course Details	CR. Hr.

	Major Subjects (any four subject from one group)		
CS.Ed.351		Software Engineering	3
CS.Ed.352	Major	Data Communication and Network	3
CS.Ed.353		Web Technology	3
CS.Ed.354		Database Management System	3
CS.Ed355	Minor	Fundamental of Computer Programming	3

B Ed 6th Semester

	Major Subjects (any four subject from one group)		
Code	Group	Course Details	CR. Hr.
CS.Ed.361		Data Warehousing and Data Mining	3
CS.Ed.362	Major	Computer Organization and Architecture	3
CS.Ed.363		Computer Graphics	3
CS.Ed.364		Management Information System	3
CS.Ed.365	Minor	Data Structure and Algorithms	3
CS.Ed.366		System Analysis and Design	3

B Ed 7th Semester

Code	Group	Course Details	CR. Hr.
		Major Subjects	
CS.Ed.471		Java Programming	3
CS.Ed.472	Major	Advanced Database Design	3
CS.Ed.473		Introduction to E-Commerce	3
CS.Ed.474		Object Oriented Analysis and Design	3
CS.Ed.475	Minor	Object Oriented Programming with C++	3

B Ed 8th Semester

Code	Group	Course Details	CR. Hr.
		Major Subjects	
CS.Ed.481		E-Governance	3
CS.Ed.482	Major	Compiler Design	3
CS.Ed.483		Project Work	3
CS.Ed.484	Minor	Web Technology	3

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Fundamental of Computer and Information Systems
Full Marks: 100
Course No.: CS.Ed.101   Pass Marks: 45

Nature of the Course: Theory and Practical   Period per Week: 3+3

Year: First, Semester: First   Time per Period: 1hr

Level: B.Ed.CSIT   Total Periods: 45+45

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1. Course Description

a) The idea behind this course is to explore various different ways in which information technology and Information Systems relates to system automation and goals in an organizational context, given the increasing inter-relationship between these two in today's global world. The course aims to acquaint the students with basic concepts of Computer Fundamental and Information Technology Theory and Practical. The course incorporates nine units. The first two unit's deals with the introductory part of Computer System. The Third unit concerns with practical aspects of Office Automation tools such as Word Processor, Spreadsheet, Database and Presentation. Likewise, the unit four and Five: Number System in computing and Boolean algebra. The sixth unit deals Telecommunication and Computer Network. The seventh unit discusses the Database Resource Management. The eighth unite-Commerce analyses utilization e-commerce in modern business. The ninth unit illustrates several ethical issues in how the use of IT in business affects employments individuality, working conditions, privacy, crime, health and solutions to societal problems.

2. Course Objectives

The general objectives of the course are as follows:

This is a basic paper of IT to familiarize the students with computer and it's applications in the relevant fields and exposes them to some functions of Microsoft office and with its utility.

By the end of this course, it is expected the student will:

Objectives:

a) To Know the Fundamentals of Computers
b) To Understand how to use Computer applications in day to Day Applications
c) Assess and explain global issues surrounding the adoption of information technology
d) Explain basic concepts about information systems development, implementation and review; and
e) Explain how companies can leverage information technology for competitive advantage for national and community development.

3. Specific Objectives and Contents

Specific Objectives	Contents
a) Know about the computer and characteristics of a computer. b) List the major parts of computer and computer system. c) Identify the types of computers. **d)** Provide examples of input and output devices. **e)** List units of measures for computer memories and storages.	**UNIT I : Fundamental of Computer (5)** • Computer system concepts, Computer system characteristics, Capabilities and limitations, • Types of computers Generations of computers, Personal Computer (PCs) – evolution of PCs, configurations of PCs- Pentium and Newer, PCs specifications and main characteristics. • Basic components of a computer system - Control unit, ALU, Input/ Output functions and characteristics, memory - RAM, ROM, EPROM, PROM and other types of memory.
a) Differentiate the two main categories of computer software. b) List the specific types of application software c) List all the major PC operating system d) Differentiate between the terms operating environment and operating systems.	**UNIT 2 : Computer Software and classification (4)** Software and its Need, Types of Software - System software, Application software, System Software - Operating System, Utility Program, Programming languages, Assemblers, Compilers and Interpreter, Introduction to operating system for PCs-DOS Windows, Linux, File Allocation Table (FAT & FAT 32), files & directory structure and its naming rules, booting process, system files Programming languages-Machine, Assembly, High Level, 4GL, their merits and demerits.
a) Identify basic word processing tools and simplify document editing. b) Explain what is meant by "selecting" parts of a document. c) Identify special features commonly found in modern word processor such as editing, formatting, mail merging etc. d) Know about some financial tools such spreadsheet. e) Define and differentiate the terms worksheet and spreadsheet.	**UNIT 3: Office Automation Software (7)** • Introduction to Office automation Suite • Word processor - characteristics of word processor such as – open word or MS Word for word processing – creating, formatting and printing documents. • Inserting objects from other MS applications - merge printing documents • Spreadsheet Application: Creating, formatting and printing worksheets- - • functions in Excel- goal seek, scenario management – financial functions – PMT,NPV, IRR, IPMT, ISPMT- statistical functions- AVERAGE, MEDIAN , AVEDEV, CORREL, INTERCEPT, MAX, MIN- database in

f)	List the types of data analysis tools commonly found in spreadsheet and describe their uses. g) Describe the basic purpose of presentation program. h) Explain process of creating a presentation slides.	spreadsheet-DMAX, DMIN, DAVERAGE, DCOUNT- graphics in Excel –creating, formatting and printing graphs- Presentation Software such as Open office presentation program or Microsoft PowerPoint – creating presentations in PowerPoint- applying templates – recording narration – presenting animation – inserting hyperlink slide number, date and time, picture into slide – slide transition running slide show.
a)	Explain why knowledge of number systems is important in computing. b) Give examples to illustrate number system conversion	**Unit 4: Number System and Their Conversion (5)** 4.1 Decimal, Binary, Octal, Hexadecimal Number System & conversion 4.2 Calculation in Binary – addition, subtraction, Multiplication, Division Unit Case Study

	a) Relate the application of logic to computing problem.
	b) To be able to represent Boolean logic problem as :
	  • Truth Table
	  • Logic circuit
	  • Boolean algebra
	
	c) Generate the Boolean expression for a system from a truth table.
	d) Apply DeMorgan's theorem to simplify a logic system
		UNIT 5: Logic Function and Boolean Algebra (5)
		
		Logic Function and Boolean Algebra
		
		Introduction of Truth Table, Boolean Expression
		
		Logic Gates –AND, OR, NOT, NAND, NOR, XOR and XNOR – its definition, use, truth table, logic symbol
		
		Duality Principle
		
		Laws of Boolean Algebra – Associative, Commutative, Distributive, Identity, Complement Laws
		
		De Morgan's Theorem : Statement and Logic Expression
		
		Venn diagram and its represent of logic gates(AND, OR, NOT)
		Unit case study

a)	Describe the benefits of using a network. b) Identify the media and topologies commonly used in networks. c) Know about the different network components. d) Illustrate the uses of network operating system. e) Explain how computer data travels over telephone line f) Explain the importance of Telecommunication in modern business process.	**UNIT 6: Telecommunication and Computer Network (5)** Use of communication and IT , Communication Process, Communication types- Simplex, Half Duplex, Full Duplex, Communication Protocols, Communication Channels - Twisted, Coaxial, Fiber Optic, Serial and Parallel Communication, Modem - Working and characteristics, Types of network Connections - Dialup, Leased Lines, ISDN, DSL, RF, Broad band ,Types of Network - LAN, WAN, MAN ,Internet, VPN etc., Topologies of LAN - Ring, Bus, Star, Mesh and Tree topologies, Components of LAN -

	Media, NIC, NOS, Bridges, HUB, Routers, Repeater and Gateways. Internet-Evolution, World Wide Web Introduction to Telecommunication and business value of Telecommunications. Telecommunication Systems in Nepal. Internet Services, Convergence of technologies.

a) Explain the importance of implementing data resource management process and technologies in an organization
b) Explain how database management software helps business professionals and supports the operations and management of a business
c) Provide examples to illustrate each of the following concepts:
    I.   Major types of database
    II.   Data warehouse and data mining
    III.   Fundamental database structure
    IV.   Database Development
	UNIT 7 : Database Resource Management **(7)**
	
	• Introduction to Database
	• Application of Database and Database Management System
	• Database Resource Management
	• File structure and its concept
	• Online, read time, and batch processing, concept of database
	• Types of database(operational , Analytical, distributed, hypermedia)
	• Data Dictionary and Data manipulating language, data planning
	• Data warehouse and data mining, Knowledge Discovery, and Knowledge Management
	
	Unit Case Study

a) Know the basic of e-Commerce, its advantages and disadvantages. b) Compare the technology of e-commerce and m-commerce.	**UNIT 8 : e-Commerce** **(3)** • Introduction to e-commerce • Types of e-commerce based on transaction • Relation of c-commerce, e-commerce, I-commerce, and m- commerce • Benefits to consumer, organization and Society Unit Case Study
a) Identify several ethical issues in how the use of IT in business affects employments individuality, working conditions, privacy, crime, health and solutions to societal problems. b) Identity several types of security management strategies and defences and explain how they can be used to ensure the security f business applications of IT.	**UNIT 9 : Security and Ethical Challenges** **(4)** **Computer Virus** and threats. Security and Ethical Challenges:Ethical responsibilities of Business Professionals – Business, technology; Computer crime – Hacking, cyber theft, unauthorized use at work; Piracy – software and intellectual property; Privacy – Issues and the Internet Privacy; Challenges – working condition, individuals; Health and Social Issues, Ergonomics and cyber terrorism

Note: The figures in the parentheses indicate the approximate periods for the respective units.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination	40	Assignments	20%	40	Practical Report copy	25%	20
(Details are given in the separate table at the end)		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

Prescribed Books

1. Peter Norton : Introduction to Computers, Tata McGraw-Hill Latest edition
2. V. Rajaraman: Introduction to Information Technology, Prentice-Hall of India, Latest edition
3. James A O'Brien : Introduction to Information System, Tata Mc-Graw Hill, latest edition

References

1. Turban, Rainer, Potter: Introduction to Information System Technology, Wiley, Latest edition

Far-western University
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B.Ed in Computer Science and Information Technology

Course Title: Algorithm and Problem Solving Using C Programming
Number of period per week: 3+3
Full Marks: 100   **Pass Marks:** 45
Nature of the Course: Theory and Practical   **Total hours:** 45+45
Course No. CS.Ed.121   **Semester:** Second
Level: B.Ed. CSIT

Course Introduction:

This course is designed to develop acquaintance with fundamental concepts of program design and computer programming. The course starts with the basic concepts of algorithm and flow chart and also includes the concepts of C programming including data types, operators, control statements, arrays, functions, pointers, structures, unions, and data files.

Course Objective:

On completion of this course, students will be able to develop their knowledge in program design and computer programming and they will be able to develop small to medium size computer programs using different concepts of C programming language.

Contents with Specific Objectives:

Specific Objectives	Contents
• Know about program, programming language, its types, and generations. • Know about compilers and interpreters and their differences. • Develop knowledge in program design tools like algorithms and flowcharts and able to write algorithms and draw flowcharts. • Identify different steps of software development life cycle.	**Unit One: Programming Preliminaries (4)** 1.1. Introduction to Program and Programming Language 1.2. Compilers and Interpreters 1.3. Program Design (Algorithms and Flowcharts) 1.4. Software Development Life Cycle
• Know about introduction of C programming and its basic structure. • Write a simple program using C compiler. • Know about different character set of C compiler. • Know about identifiers and keywords and their differences. • Know about basic data types, qualifiers, and conversion. • Know about variables and constants and their differences. • Know about different styles of writing comments.	**Unit Two: C Fundamentals (4)** 2.1. Introduction and Basic Structure 2.2. Writing a Simple C Program 2.3. The C Character Set 2.4. Identifiers and Keywords 2.5. Data Types 2.6. Variables and Constants 2.7. Writing Comments 2.8. Operators 2.9. Expressions and statements

• Know about different types of operators, their precedence, and associativity. • Know about different types of expressions and statements	
• Know about getchar() and putchar() functions for input and output • Know to enter data using scanf function • Know to output data using printf function • Know about gets and puts functions for input and output	**Unit Three: Data Input and Output (4)** 3.1. Single Character Input – The Getchar Function, Single Character Output – The Putchar Function 3.2. Entering Input Data – The Scanf Function 3.3. Writing Output Data – The Printf Function 3.4. The Gets and Puts Functions
• Develop knowledge about if statement and its types, and switch statement along with the flow chart and example • Know about different looping statements and their similarities and differences • Know about different nested control statements • Know and use break and continue statements	**Unit Four: Control Statements (5)** 4.1 Branching Statements – If and Switch Statements 4.2 Looping Statements – For, While, and Do While Statements 4.3 Nested Control Statements 4.4 Break and Continue
• Know about uses of functions along with function prototype, definition, and function call • Develop knowledge on advantages of using functions • Know about different types of functions • Develop knowledge about recursive function and comparing it with non-recursive function • Know about different storage classes like automatic, external, static • Develop knowledge about the preprocessor directives	**Unit Five: Functions (6)** 5.1. Introduction, Function Prototype, Function Definition, and Function Call 5.2. Advantages of Using Function 5.3. Types of Functions – Library Function and User Defined Function 5.4. Recursive Function 5.5. Storage Classes 5.6. The Preprocessor - #include and #define
• Develop knowledge about arrays including array definition and its processing • Know to pass arrays to functions • Develop knowledge about multidimensional arrays • Develop knowledge about strings and its processing	**Unit Six: Arrays (5)** 6.1. Defining Array and Processing an Array 6.2. Passing Arrays to Functions, 6.3. Multidimensional Arrays 6.4. Strings
• Develop knowledge on pointers and its declaration • Know to pass pointers to functions	**Unit Seven: Pointers (7)** 7.1. Fundamentals and Pointer Declarations 7.2. Passing Pointers to a Functions

• Comparing one dimensional array with pointer • Know to allocate memory dynamically • Develop knowledge about different operations on pointers • Comparing pointers with multidimensional arrays • Develop knowledge on arrays of pointers	7.3. Pointers and One-dimensional Arrays 7.4. Dynamic Memory Allocation 7.5. Operations on Pointers 7.6. Pointers and Multi-dimensional Arrays 7.7. Arrays of Pointers
• Develop knowledge about structures and know to process it • Know about typedef • Develop knowledge to use structures and pointers • Know to pass structures to functions • Know about self-referential structures • Know about unions and its comparison with structure	**Unit Eight: Structures and Unions(5)** 8.1. Defining and Processing Structure 8.2. User Defined Data Types (Typedef) 8.3. Structures and Pointers 8.4. Passing Structures to Functions 8.5. Self-referential Structures 8.6. Unions
• Develop knowledge about importance of file handling • Know to open and close data files • Know to read and write data files • Know about processing a data file • Know to use unformatted data files and binary files	**Unit Nine: Data Files (5)** 9.1. Why Files 9.2. Opening and Closing a Data File 9.3. Reading and Writing a Data File 9.4. Processing a Data File 9.5. Unformatted Data Files and binary files

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Recommended Books:
1. Programming with C, Byron S Gottrried, Third Edition
2. A Book on C, Programming in C, Al Kelley and Ira Pohl, Pearson Education, Fourth Edition
3. The C programming language, Brian W. Kernighan and Dennis M. Ritchie

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B.Ed. in Computer Science and Information Technology

Course Title: Digital Logic   **Number of period per week:** 3+3
Course No.CS.Ed.122.1
Full Marks: 100   **Pass Marks:** 45
Nature of the Course: Theory and Practical   **Total hours:** 45+45
Year: First   **Semester:** Second
Level: B.Ed.CSIT

Course Introduction:
This course provides students with the basic concept of digital logic, organization and architecture of digital computers as foundation for more advanced computer related studies. After completing the course students will be able to design simple digital devices and implement them. Laboratory work is essential in this course. The course consists of eight units.

Course Objective:
➢ To introduce fundamental digital logics and switching networks as well as to exposure of Boolean algebra and its application for circuits analysis
➢ To introduce to multilevel gates networks, flip flips, counters and logic devices.

Specific Objectives and Contents

Specific Objectives	Contents
• Differentiate between digital and analog system • Introduce the concept of number system and its application in computer system. • Deal with the different number system in arithmetic • Define and learn the basics about the digital and ASCII,EBCDIC & UNICODE and use the codes in arithmetic • Work with error handling and error detection codes.	**Unit 1: Introduction (7 Hrs)** 1.1. Introduction to Analog and Digital system 1.2. Features of Digital Systems 1.3. Numbers System-Decimal, Binary, Octal, Hexadecimal and their inter conversions. 1.4. Binary Arithmetic Arithmetic. Complement system and subtraction using 1's, 2's, 9's and 10's complement method. 1.5. Codes. BCD,XS-3, Gray, code, hamming code, alphanumeric codes(ASCII,EBCDIC, UNICODE), 1.6. Error detection and error correcting codes.
• Explorer the concept of Boolean Logic and algebra • Implement the operation of logic gates in real practical scenario • Introduction of Boolean algebra and laws of Boolean Algebra • Exercises on realizing circuits with	**Unit 2: Logic Gates and Boolean Algebra (6 Hrs)** 2.1. Basic definition of Boolean Algebra 2.2. Basics Theory of Boolean Algebra, Boolean Functions, Logical operations 2.3. Logics Gates, IC Digital Logic Families. Basics(AND,OR,NOT gates) 2.4. Universal gates(NAND and NOR gates),

universal gate.	other gates(XOR,XNOR gates) 2.5. Boolean indemnities, De Morgans Laws 2.6. **Lab Work: Verification of AND, OR ,NOT, NAND, NOR, XOR, and XNOR gate**

• Solve the Boolean expressions using following techniques
   ➢ Boolean algebra
   ➢ K-Map
   ➢ Quine McClusky Method
	Unit 3: Simplification of Boolean Functions (5 Hrs.)
	3.1. Simplification of Boolean algebra using Boolean rules
	3.2. K-map method (two, three, and four variables Maps) , Don't care conditions
	3.3. Canonical and standards forms, products of sums, and sum of product simplification
	3.4. NAND and NOR implementation
	3.5. Quine McClusky method

• Introduce and implement following combinational circuits:
   ➢ Adder
   ➢ Multiplexer and demultiplexer
   ➢ Encoders and decoder
• Combinational circuits design
• Binary and decimal adder
	Unit 4: Combinational Circuits Design (6 Hrs)
	4.1 Half adder, full adder, half subtracter, and full subtracter
	4.2 Code converters
	4.3 Multiplexers and demutiplexers
	4.4 Encoders and decoders
	4.5 Combinational Circuits design procedure
	4.6 Binary Parallel Adder
	4.7 Decimal Adder
	Lab: Design the adder and subtracter, implement logic of Mux/Demux and Encoder /Decoder, Design the number system converter circuit , Design various Decision making circuits

• Introduce and explore the basic concept of Sequential Logic Circuits design • Understand about different types of flip flops	**Unit 5: Sequential Circuits Design (7 Hrs)** 5.1. Flips-flops: RS, JK, D, and T, Latches 5.2. Triggering of flip flops 5.3. Master slave flip flop 5.4. Flip flop excitation table and design procedure 5.5. State diagram and simple sequential circuits **Lab: Design the difference types of flip-flops.**
• Understand counters & Shift Registers. • Learn electronic part of memories • Describe digital logic families	**Unit 6: Registers, Counters, Memories and Programmable Logic Devices (5)** 6.1. Registers, Shift register

• Analyze and design synchronous sequential circuits • Analyze asynchronous sequential circuits	6.2. Analysis of synchronous sequential circuit 6.3. Design of synchronous sequential Circuits: Counters, state diagram, state reduction, state assignment 6.4. Analysis of asynchronous sequential circuit 6.5. Problems of asynchronous sequential circuits design 6.6. Memories: ROM,PROM,EPROM 6.7. PLD, PLA 6.8. Design Logic Families: TTL, ECL, and CMOS **Lab: Design any clock driven sequential circuit, verify the principle of conversion of parallel data into serial.**
• Introduce and explorer the basic concept of VHDL • Design simple circuits by using VHDL	**Unit 7: VHDL (6 Hrs)** 7.1. RTL Design, Combinational Logic, types, Operators, Packages, sequential Circuits, Subprogram, Examples: Adders, Counters, Flip- flops, Multiplexers, Demultiplexers.

Evaluation system

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

- R. P. Jain, " **Modern Digital Electronics**", 3rd Edition, McGraw Hill
- M. Morris Mano, "**Logic & Computer Design Fundamentals**", Pearson Education

Course Title: Data Structure and Algorithm

Full marks: 100	**Pass Marks:**
45**Number of period per week: 3+3**	**Sub. Code: CS.Ed. 231**
Nature of the Course: Theory + Lab	**Total hours: 45+45**

Year: Second, Semester: Third

Level: B. Ed. CSIT

1. Course Introduction

This course Data Structure and Algorithm is introduce to teach students how to design, write, and analyze the performance of C/C++ programs that handle structured data and perform more complex tasks, typical of software projects. Students should acquire skills in using generic principles for data representation & manipulation with a view for efficiency, maintainability, and code-reuse.

Successful students will, at the end of the course, be able to demonstrate analytical comprehension of concepts such as abstract data types (vectors, lists, deques, trees, etc.), generic programming techniques (containers, adaptors, accessing data through interface, iterators, etc.), algorithms (sorting, using stacks and queues, tree exploration algorithms, etc.), and efficiency analysis (which data structures allow efficient interfaces to particular forms of data access, such as random vs. sequential data access or insertion). The students should be able to demonstrate similar skills in related implementation tasks in the C/C++ language, including extensive use of templates to allow for modularity and re-usability of code.

2. Objectives

The objective of this course is to teach fundamental concepts of programming that will enable you to solve interesting, challenging real world problems with reliable, modular programs that can be tested, extended, shared with others, and combined effectively with other programs. You will learn about:
● data types and data abstraction
● how data is represented in memory
● how to decompose complex programming problems into manageable subproblems
● how and when to use elementary data structures such as arrays, lists, trees, and maps
● different approaches to structuring programs (objectoriented, imperative, functional)
● communication between programs and their environment
● how to test and fix programs (unit testing, debugging)

3. Specific Objectives and Contents

Specific Objectives	Contents
After completion upon the unit the students will be able to: • Define data structure and algorithm	**Unit I: Introduction to Data Structure (7)** 1.1. Concept and classification of data structure 1.2. Abstract date type

• Write and execute the push and pop operation of stack • Detect and debug the errors • Implement of stack application in real problem soving.	1.3. Implementation of data structure 1.4. Algorithm, performance and analysis **1.5. Introduction to Stack** 1.6. Stack as an ADT 1.7. POP and PUSH concept and operation 1.8. Stack application: Evaluation of Infix Postfix and prefix expressions
After completion upon the unit the students will be able to: • Define QUEUE and queue as ADT • Differentiate the types of queues and their nature • Write and execute the codes for queue operation on different types of queue • Detect and debug the errors • Implement of queue application in real problem solving.	**Unit II: QUEUES** (5) 2.1. Definition 2.2. Queue as an ADT 2.3. Primitive operations in queue: Linear and circular queue and their application 2.4. Enqueue and Dequeue 2.5. Priority queue
After completion upon the unit the students will be able to: • Explorer the information of Linked List and linked list as ADT • Differentiate the types of linked list and their nature • Write and execute the codes for Linked list operation on different types of queue • Detect and debug the errors • Implement of linked list application in real problem solving.	**Unit III: Linked List** (7) 3.1. Definition and link list as an ADT 3.2. Types of linked list 3.3. Dynamic implementation 3.4. Basic operations in `linked list: node insertion deletion, insertion and deletion after and before nodes linked stacks and Queues 3.5. Doubly linked lists and its advantages 3.6. Sparse Matrix
After completion upon the unit the students will be able to: • Define the recursion • Identify the need of recursion • Write and execute the codes for recursive program • Detect and debug the errors	**UNIT IV: Recursion** (3) 4.1. Principle of recursion, Advantages and disadvantages of recursion. 4.2. Implementation recursion on: Factorial, GCD, TOH and Fibonacci sequence 4.3. Comparison between recursion and iteration, recursion example 4.4. Applications of recursion
After completion upon the unit the students will be able to: • Define tree and able to explorer the uses of tree in data structure. • Differentiate the types of tree • Write and execute the codes for tree operation • Detect and debug the errors	**UNIT V: Trees** 5.1. Concept and definitions 5.2. Tree search and insertion /deletions binary tree traversals (preorder , post order and in order) tree height level and depth 5.3. Introduction to Binary tree(Representation and Creation) 5.4. Operations of Binary tree

	5.5. Balanced trees : AVL balanced trees , Balancing algorithm 5.6. The Huffman algorithm 5.7. Game tree, B- Tree
After completion upon the unit the students will be able to: • Define terminologies used in graph and able to explorer the uses of graph in life problems. • Differentiate the types of graph • Write and execute the codes for graph operation • Detect and debug the errors	**UNIT VI: Introduction to Graphs** 6.1. Basic terminology of graph 6.2. Representation, implementation and applications 6.3. Graphs as an ADT 6.4. Graphs types, Graphs traversal 6.5. Transitive closure 6.6. Wars hall's Algorithm 6.7. Spanning forests 6.8. Kruskal's and Round Robin algorithms 6.9. Shortest-path algorithm: Greedy algorithm, Dijkstra's Algorithm
After completion upon the unit the students will be able to: • Compare and select the best searching techniques • Write and execute the codes for searching process • Observe, detect, and debug the errors	**UNIT VII: Searching and Hashing** 7.1. Introduction 7.2. Linear search Vs Binary Search 7.3. Hashing 7.4. Hashing Terminology(Hash function and table) 7.5. Bucket overflow
After completion upon the unit the students will be able to: • Write and execute the codes for different types of sorting • Observe, detect, and debug the errors • Compare the time, space and performance complexity of different types of sorting	8.1. **UNIT VIII: Sorting** 8.2. Introduction and application of sort 8.3. Types of sorting 8.4. **Bubble sort, Insertion sort, Selection sort, Quick sort, Radix sort, Merge sort, Heap sort, Shell sort.** 8.5.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal	50%				

		Exams					
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

- G. S. Baluja, "*Data structure Through C, A Practical Approach"*, Dhanpat Rai & Co., 2003.

References

- Y Langsam , MJ , Augenstein and A.M , Tanenbaum   *Data Structures using C and C++* , Prentice Hall India.

- G.W Rowe, *Introduction to Data Structure and Algroithms with C and C++* , prentice Hall India .

Far-western University
Faculty of Education
B.Ed in Computer Science and Information Technology

Course Title: Object Oriented Programming with C++   **Credit: 3**
Course No: CS. Ed. 232.2   **Number of period per week: 3+3**
Nature of the Course: Theory + Lab   **Total hours: 45+45**
Year: Second, Semester: Third
Level: B. Ed.CSIT

1. Course Introduction
This course describes basic features of C++ that are different from C programming language. It also covers principles of object oriented programming like polymorphism, class, object, encapsulation, inheritance etc. Besides this, the course describes features like exception handling, templates and File handling using C++.

2. Objectives
At the end of this course the students should be able to:
- Differentiate structured programming from object oriented programming.
- Understood principles of object oriented programming
- Write programs using OOP principles
- Use concepts like exception handling and generics in programming
- Apply C++ in solving scientific problems and simulation

3. Specific Objectives and Contents

Specific Objectives	Contents
- Understand programming language paradigms and History. - Use cin and cout objects along with insertion and extraction operators. - Enable to manage memory dynamically by using New and Delete operators. - Describe reference variables, Scope resolution operator, and Enumerations.	**Unit I: C++ Basics(5)** 1.9. Programming Language Paradigms: Unstructured Programming, Procedural Programming, Modular, Programming, Object Oriented Programming. History of C++. 1.10. Input and Output in C++, Manipulators, Reference variable, Comments, Type Conversion. 1.11. put() and get() Functions, getline() Function. 1.12. New and Delete Operators, Scope Resolution Operators, Enumerations.
- Understand difference between Functions, Macros, and Inline Functions - Use concept of default arguments and method	**Unit II: Functions (5)** 2.6. Drawbacks of Functions, Macros, Macro vs Functions, Inline Functions, Macros vs Inline Functions. 2.7. Default Arguments, Overloaded Functions: With Different Number of Arguments, with Different Type

overloading • Enable to pass arguments and get output from function in different ways.	of Arguments. 2.8. Passing Arguments to Functions: Pass by Value, Pass by Reference, Pass by Pointer 2.9. Returning from Functions: Returning by Value, Return by Reference, Return by Pointer. 2.10. Constant Arguments
• Understand class, object, encapsulation and data hiding. • Explain memory allocation strategy data members and member functions. • Use arrays of objects, pointer objects, and object as argument. • Understand the concept of friend function, friend class and this pointer • Apply the concept of construction and destructors in writing programs.	**Unit III: Class and Objects(10)** 3.7. C++ Structures vs C Structures, Class and Objects, Defining Member Functions, Memory Allocation for Objects and methods. 3.8. Array of Objects, Pointer Objects, Access Specifiers, Passing Objects as Arguments, Returning Objects. 3.9. Static Data Members, Static Methods, Nested Class. 3.10. Friend Functions, Friend Class, This Pointer 3.11. Constructors, Types of Constructors, Constructor Overloading, Copy Initialization, Destructors
• Understand importance and need of operator overloading. • Enable to overload different operators. • Enable to write programs that converts data of one type into another type. • Use nameless temporary objects.	**Unit IV: Operator Overloading (7)** 4.5. Introduction, Operators that cannot be overloaded, Rules for Operator Overloading. 4.6. Overloading Unary Operators: Pre-increment operator, Post-increment operator, Negation Operator. 4.7. Overloading Binary Operators: Plus/Minus Operator, Comparison Operators, String Concatenations, Overloading using friend Functions. 4.8. Nameless Temporary Objects 4.9. Type Conversion: Basic to Object, Object to basic, Object to Object.
• Describe need and importance of inheritance • Use inheritance in writing programs • Understand and program different forms of inheritance. • Understand ambiguities in inheritance and handle them. • Use containership and differentiate it from inheritance.	**Unit V: Inheritance & Aggregation (7)** 5.8. Introduction, Benefits, Forms of Inheritance, Protected Access Specifier. 5.9. Public, private, and Protected Derivation. 5.10. Constructor and Inheritance, Destructor and Inheritance 5.11. Method Overriding, Ambiguities in Inheritence: Multiple Inheritance,Multipath Inheritance, Virtual Base Class. 5.12. Containership, Inheritance vs Containership.
• Differentiate static and dynamic polymorphism • Enable to program dynamic polymorphism • Understand importance of pure	**Unit VI: Dynamic Polymorphism(4)** 6.10. Static vs Dynamic Polymorphism, Pointers to base Classes, Virtual Functions 6.11. Implementing Dynamic Polymorphism, Pure Virtual Functions. Abstract Classes

virtual functions and abstract classes.	6.12. Virtual Destructors
• Understand exceptions and differentiate it from errors. • Enable to catch and handle exception in programs. • Program own exceptions	**Unit VII: Exception Handling(3)** 7.6. Exception vs Error, Exception Handling mechanism. 7.7. Throw Statement, Try and Catch Statements, Multiple Catch Statements, Catching All Exceptions. 7.8. Nested try-catch, User Defined Exception
• Understand concept of streams. • Enable to read/write text and binary files • Use random file access in file handling	**Unit VII: Input/output with Files (4)** 8.6. Streams, Opening and Closing Files, Reading and Writing Text Files. 8.7. Detecting End of File, Reading and Writing Binary Files, Random File Access.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

- *Object-Oriented Programming in C++*: Robert Lafore, Sams Publishing, 4th edition, 2002

References

- *C++ Programming with Object Oriented Approach*, Arjun Singh Saud, KEC Publication, Kathmandu, First Edition 2012.
- *C++ How To Program,* Paul J. Ditel & Dr. Harvey M. Ditel, Prentice Hall, 9th Edition, 2013

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course**: Operating system**   Full marks: 40+40+20
Course No. CS.Ed.241   Pass marks: 45
Nature of the course: Theory and Practical   Total periods: 45+45
Semester: Fourth   Time per period: 1 hr
Level: Undergraduate   Program: B Ed.CSIT

1. Course Description

This course helps to give fundamental concepts of uniprocessor operating systems. Evolution process management, Memory management, File systems, I/O processing.This course introduces fundamental concepts of contemporary uniprocessor operating systems.

2. Course Objectives

The general objectives of the course are as follows

- To understand the use of operating system
- To highlight the services of operating system
- To understand the functions of operating system
- To discuss about system interface and system calls.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Describe the complete overview of operating system. • Describe evolution of operating system and types of OS. • Describe personal computer operating system • Explain the system calls	**Unit I: Overview of operating system. (10)** 1.1.Historical background: Introduction of operating system. 1.2. Evaluation of operating system, types of operating system. 1.3.Functions of operating system, operating system as a resource manager. 1.4.Operating system operations, operating system services. 1.5.User operating system, system interface, system calls , Types of system calls.
• Discuss the basic concept of process scheduling. • Explain the operation on process. • Discuss about process scheduling.	**Unit II Process (12)** 2.1.Basic concept of Process Scheduling. 2.2 Operation on process, inter process communication. 2.3Process Scheduling - Scheduling Criteria. 2.4 Scheduling Algorithms, Multiple Processor Scheduling

• Explain the memory management. • Explain how to use multiprogramming and swapping. • Describe virtual memory, paging. • Discuss about file system and file management.	**Unit III: Memory management (14)** 3.1. Memory management: Absolute and relocable partition, multiprogramming, swapping, overlays. 3.2. Virtual memory, paging, page replacements algorithms, segmentation, segmentation with paging. 3.3 File systems: file system interface, file system implementation.
• Describe the process coordination. • Discuss role of synchronization. • Discuss about dead lock and prevention. • Discuss about the dead lock detection. • Explain the use of MS DOS, UNIX, LINUX, and WINDOWS.	**Unit IV. Process Coordination (10)** 4.1. Synchronization - The Critical Section problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors 4.2. Dead Locks: System Model, Dead Lock Characterization, Methods of Handling , Dead Lock Prevention, Dead Lock Avoidance.. 4.2. Dead Lock Detection, Recovery from Dead Lock 4.3 introduction: MS DOS, Unix , Linux, Windows
• Explain about Device management and disk management. • Discuss about Disk scheduling and error handling. • Exemplify important of file system and allocation method.	**Unit V: Device and Storage management (14)** 5.1. Device management: I/O hardware and software, software layers. 2.2. Disk management: Disk structure, Disk scheduling, error handling and formatting, RAID, stable storage management. 5.3. File System: - File Concept, Access Methods, Directory Structure, protection, Implementing File Systems:-File System Structure, Directory Implementation, Allocation methods of Space Management, Efficiency and Performance, Recovery.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

4. Prescribed Books

Textbooks: Andrew S. **Tanenbaum, Modern Operating Systems**, 2nd Edition, Prentice-Hall.
References:
Silberschatz, Galvin and Gagne, **Operating System Concepts**, 6th Edition, Addition Wesley.
Operating System Principles, Seventh Edition, Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley

Operating Systems- By William Stallings

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course: **System Analysis and Design**   Full marks: 40+40+20
Course No. CS. Ed.242   Pass marks: 45
Nature of the course: Theory and Practical   Total periods: 45+45
Semester: Fourth   Time per period: 1 hr
Level: Undergraduate   Program: Bed. CSIT

1. Course Description

This course help launch the careers of successful systems analyst – or of users assuming an active role in building systems that satisfy their organization's information needs. Also provides a solid foundation of systems. This course will provide the concept of system representation and this course provide the basic concept of how to develop the foundation of new system.

2. Course Objectives

The general objectives of the course are as follows

- To understand the use of information system in education
- To highlight information systems and their effectiveness in education.
- To give better way of system design tools
- To discuss role of system implementation and feasibility study
- To provide concepts of object oriented analysis and design

3. Specific Objectives and Contents

Specific Objectives	Contents
• Identify characteristic, advantages, drawbacks of system analysis. • Describe evolution of system design. • Describe types of information system • Describe the SDLC • Describe the System design tools.	**Unit I: Overview of Systems Analysis and Design. (8)** 1.6. Introduction to system analysis and system design 1.7. Types of Information Systems and Systems Development. 1.8. Developing Information Systems and the Systems Development Life cycle 1.9. Systems analysis and design tools

• Discuss the need for structured methodology. • Explain importance of Enabling technology • Describe the of data dictionaries.	**Unit II Modeling Tools for Systems Analyst 5 Hrs. (8)** 2.2. Need for a Structured Methodology. 2.3. CASE as an Enabling Technology 2.3 Advantages and Disadvantages of Modeling and Data Dictionaries, Other Specification Tools
• Explain the modeling of DFD and Flow charts • Explain how to Drawing DFDs and flowchart. • Describe Entity Relationship Diagram.	**Unit III: Modeling Tools for Systems Analyst (8)** 3.3. Modeling with Data Flow Diagrams and Flowcharts 3.4. Drawing DFDs, Flowcharts. 3.5. Entity- Relationship Diagrams
• Describe the overview of SDLC • Discuss role of system software and application software's • Discuss about system planning and investigation. • Discuss the tools of structured of System analysis. • Explain the use of Feasibility study for system developing process.	**Unit IV. Systems Analysis (10)** 4.3. Overview of System development lifecycle. 4.4. System planning and initial Investigation. 4.5. Information Gathering. 4.6. The tools of Structured Analysis, Feasibility study: Technical, Economical, Operational, Scheduling Feasibility study.
• Explain the process of system design. • Discuss the process of forms design. • Discuss of database design and file organization.	**Unit V: Systems Design (8)** 5.1. The process and Stages of system Design. 5.2. Input and Output Forms Design. 5.3. Database, File Organization. 5.4. Database Design.
• Explain types of system testing .Describe system implementation and conversion. • Discuss system maintenance. • Discuss the Project scheduling	**Unit VI: System Implementation (10)** 6.1. System Testing, white box, black box and quality Assurance. 6.2. Software implementation, pilot, parallel phased, direct conversion and software maintenance. 6.3. Hardware and software selection. 6.4. Project scheduling and software.
• Discuss OOP Development life cycle. • Explain Unified Modeling	**Unit VII: Object-Oriented Analysis and Design (8)** 7.1. Overview: Object-Oriented Development Life Cycle.

language. • Describe object modeling • Dynamic Modeling	7.2. The Unified Modeling Language and use case modeling. 7.3. Object modeling: Class Diagram 7.4. Dynamic Modeling: State Diagrams. 7.5 .Dynamic Modeling: Sequence Diagramming, Analysis Verses Design

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

4. Prescribed Books

Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich

Modern Systems Analysis and Design, Pearson Education, Second Edition

Laudon, K. C. and Laudon, J. P. (2010) *Management Information Systems*, 11th Edition
  Pearson.

Englewood Cliffs, New Jersey, **Systems Analysis and Design.** Jeffrey L. Whitten, Loonnie D.

Bentley, 5rd Edition, **Systems Analysis and Design Methods.**

Grady Booch, Pearson Education, **Object Oriented analysis and design with applications.**

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course: **Discrete Structure**

Course No. CS. Ed.243
Nature of the course: Theory
Semester: Fourth
Level: Undergraduate

Pass marks: 45
Total periods: 60
Time per period: 1 hr
Program: B.Ed.CSIT

1. Course Description

This course is developed to introduce the fundamental concept of discrete mathematics and how to apply mathematical concept in computer science. This course provide the way that how to represent logics in real world and it also provide the knowledge of mathematical reasoning, algorithmic thinking and application modeling.

2. Course Objectives

The objective of this course is to teach the fundamental concepts of discrete mathematics that will enable students to solve the interesting and challenging real world problems. This course does not directly help us write programs. At the same time, it is the mathematics underlying of almost all of computer science. At the end of this course the students should be able to:

- Gain knowledge in discrete mathematics and finite state automata in an algorithmic approach.
- Gain fundamental and conceptual clarity in the area of logic, reasoning, algorithms, recurrence relation, and graph theory.
- Design high-speed networks and message routing paths.
- Find good algorithms for sorting.
- Design the good web search algorithm.
- Analyze algorithms for correctness and efficiency.
- Formalizing security requirements.
- Designing cryptographic protocols

Course Contents:

Specific objectives	Unit 1: Logic, induction and Reasoning (13 hrs.)
1. Introduce the concept of propositional logic	1.1. Proposition and Truth function 1.2. Propositional Logic

2. Implement the expression in propositional logic 3. Define predicate logic 4. Explore the concept of validity 5. Introduce the concept of deduction 6. Introduce the concept of inference 7. Explain the rules of inference 8. Differentiate formal and informal proof 9. Differentiate between induction and complete induction	1.3. Expressing statements in Logic Propositional Logic 1.4. The predicate Logic 1.5. Validity 1.6. Informal Deduction in Predicate Logic 1.7. Rules of Inference and Proofs 1.8. Informal Proofs and Formal Proofs 1.9. Elementary Induction and Complete Induction
	Unit 2. Finite State Automata (12 hours)
1. introduce the concept of finite state automata 2. explain the concept of language and grammar 3. describe the different types of grammar 4. differentiate between NFA and DFA 5. exercise on language accepted by finite automata 6. explore the concept of regular expression	2.1. Sequential Circuits and Finite state Machine 2.2. Finite State Automata 2.3. Language and Grammars 2.4. Non-deterministic Finite State Automata 2.5. Language and Automata 2.6. Regular Expression and its characteristics
	Unit 3: Recurrence Relation (8 hours)
1. introduce the concept of recurrence relations 2. solve the linear and non linear recurrence relations 3. design algorithm	3.1. Recursive Definition of Sequences 3.2. Solution of Linear recurrence relations 3.3. Solution to Nonlinear Recurrence Relations 3.4. Application to Algorithm Analysis
	4. Graph Theory (15 hours)

1. Introduce the concept of graph	4.1. Undirected and Directed Graphs
2. Explain the different way of representing graph	4.2. Walk Paths, Circuits, Components
	4.3. Connectedness Algorithm
3. Explore the basic concept of path and circuits	4.4. Shortest Path Algorithm
	4.5. Bipartite Graphs, Planar Graphs, Regular Graphs
4. Working on connectedness algorithms	4.6. Planarity Testing Algorithms
5. Find the shortest path between source and destination	4.7. Eulerian Graph
6. Deduce the concept of planarity testing	4.8. Hamiltonian Graph
7. Differentiate between Eulerian and Hamilton graph	4.11. Cutsets and Cutvertices
	4.12. Network Flows, Maxflow and Mincut Theorem
8. Explain the concept of cuts and cut vertices	4.13. Data Structures Representing Trees and Graphs in Computer
9. Describe the Network flow problem	4.14. Network Application of Trees and Graphs
10. Working on Maxflow and Mincut theorem	
11. Represent the graph and tress in computer	
12. Find the application of Tress and graphs	

Evaluation System

External Evaluation	Marks	Internal Evaluation	Weight age	Marks
End semester examination		Assignments	20%	
(Details are given in the separate table at the end)		Quizzes	10%	
		Attendance	20%	
	60	Internal Exams	50%	40
Total External	60	Total Internal	100%	40

References

1 Kenth Rosen, "Discrete Mathematical Structures with Applications to Computer Science", WCB/ McGraw Hill

2 G. Birkhoff, T.C. Bartee, "Modern Applied Algebra", CBS Publishers.

3 R. Johnsonbaugh, "Discrete Mathematics", Prentice Hall Inc.

4 G.Chartand, B.R.Oller Mann, "Applied and Algorithmic Graph Theory", McGraw Hill

5 Joe L. Mott, Abrahan Kandel, and Theodore P. Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice-Hall of India.

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Software Engineering   **Credit: 3**

Course No: CS. Ed. 351   **Number of period per week: 3+3**

Nature of the Course: Theory + Lab   **Total hours: 45+45**

Year: Third, Semester: Fifth

Level: B. ED.CSIT

1. Course Introduction
This course is aimed to understanding of the software engineering discipline and its application to the development of software. It cover the software concept, different software process models, and software requirements engineering process, systems analysis and design as a problem-solving activity, design architecture, configuration management and software quality assurance to software development process.

2. Objectives
After completion of Software Engineering course, Students will be able to:
- Understands the systematic, discipline and quantifiable approach of software development process and phases.
- Demonstrate problem solving, critical thinking and analytical skills in building and maintaining quality software systems in the most cost effective manner.
- Demonstrate leadership and creativity in software industries with proficient in oral and written communication, and effective in teamwork with the highest levels of ethical standards and social responsibilities.
- Engage in lifelong learning, advance their knowledge, and have skills and ability to pursue graduate studies and do research in software engineering and related interdisciplinary areas.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Define software, characters and categories • Explore changing nature of software • Explain s/w engineering. • Understand s/w process structure.	**Unit I: Software and Software Engineering (4 Hrs.)** 1.13. Definition, characteristics and application domain of software 1.14. Changing Nature of Software 1.15. Definition of software engineering and software process 1.16. Software Process Structure
• Analyze the modern software development process	**Unit II: Software Development Process Model(5 Hrs.)** 2.11. Waterfall Model and Prototype Model

• Compare the classical and evolutionary model • Apply the Agile process in software development • Define OOPS development model.	2.12. Rapid Application Development Model 2.13. Spiral Model 2.14. Agile Process: Extreme Programming. 2.15. 0bject Oriented Software Development Model
• Create the function and non-functional requirement of software. • Understands the document structure of software requirement. • Identify the requirement engineering process in real development process.	**Unit III: Requirements Engineering (5)** 3.12. Functional and non-functional requirements 3.13. User requirements 3.14. System requirements 3.15. The software requirements document 3.16. Requirements specification 3.17. Requirements engineering processes 3.18. Requirements elicitation and analysis 3.19. Requirements validation 3.20. Requirements management
• Identify the software modeling concept • Describe the model driven software engineering • Understand data models. • Explain the architecture design and pattern • Understands the mobile and web development architecture	**Unit IV: System Modeling and Architecture Design (7 Hrs.)** 4.10. Context models, Interaction models. 4.11. Structural models, Behavioural models 4.12. Data Models 4.13. Application architectures 4.14. Web Application Design 4.15. Mobile Application Design
• Understand object oriented design principle • Describe UML • Design and Draw Use Case, Activity, Sequence. • Define Class, Component diagram • Understand Deployment Diagram.	**Unit V: Object Oriented Design (7 Hrs.)** 5.1. Object Oriented design principle and process 5.2. Unified Model Language 2.0 5.3. Use Case Diagram, Activity Diagram, Sequence Diagram 5.4. Class Diagram 5.5. Component Diagram 5.6. Deployment Diagram
• Understand software configuration process. • Define change management. • Describe the version management and maintenance process • Define system building. • Explain case tools. • Describe the software	**Unit VI: Configuration Management (6 Hrs.)** 6.13. Software Configuration Management planning 6.14. Change management 6.15. Version and Release management 6.16. System building 6.17. CASE tools for Configuration Management 6.18. Software Re-Engineering

	engineering process.	
• Understand concepts of software Testing and Approach • Explain black and white box testing. • Define the process of unit, integration and system Testing • Compare Validation and System Testing • Understands the Mobile and Web Application Testing Approach • Understand concept the Quality Assurance	**Unit VII: Software Testing Strategies (7Hrs.)** 7.1 Strategic Approach of Software Testing 7.2 Black Box and White Box Testing Approach 7.3Unit and Integration Testing , Validation and System Testing 7.4Testing Object Oriented software 7.5Testing Web Application ,Testing Mobile Application 7.6Testing Tools 7.7Software Quality Assurance	
• Understand concept of project and its activities • List the planning activities • Use Risk management and Cost estimation tools	**Unit VIII: Software Project Management (4 Hrs.)** 8.1 Project Activities 8.2Project Planning 8.3Risk Management 8.4Cost Estimation	

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Texts

1. Sommerville, I. (2010). Software engineering. 9th Edition, Wokingham, England: Addison-Wesley Pub. Co.

2. Pressman, R.S (2014)., "Software Engineering – A Practitioner's Approach", 8th Edition, New Delhi, McGraw Hills

References

1. LethbridgeTimothy and LaganiereRobert (2010). Object-oriented Software Engineering: Practical Software Development using UML and Java. New Delhi, McGraw Hills

2. Pankaj Jalote,(2005) "An Integrated Approach to Software Engineering", 3rd Edition,New Delhi, Narosa Publishing House.

3. Pfleeger, S. L., & Atlee, J. M. (2010). Software engineering: theory and practice (4th ed). N.J. Prentice Hall.

4. Schwaber, K., &Beedle, M. (2002). Agile software development with Scrum. Upper Saddle River, NJ: Prentice Hall.

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Data Communication and Networks   **Credit: 3**

Course No: CS.Ed.352   **Number of period per week: 3+3**

Nature of the Course: Theory + Lab   **Total hours: 45+45**

Year: Third, Semester: Fifth

Level: BED

1. Course Introduction

The purpose of this course is to build up the capacity on student's to understand basic and some advance concepts regarding to the communication and Networking. It includes a detailed discussion of the different Network Models and Communication Models. Concepts that have a direct effect on the efficiency of a network (e.g. collision and broadcast domains, topology) are also discussed. Concepts on different network technologies, distributed computation, networking, and communication software, security issues and different Networking and communication protocols are also discussed.

2. Objectives

At end of the course, students are expected to / able to:

- Be familiar with the different Network Models and Communication Models.
- Understand different network technologies
- Understand the different signal encoding techniques
- Be updated with different advanced network technologies that can be used to connect different networks
- Be familiar with various hardware and software that can help protect the network
- Know the advantage of using a network management system
- Setup the Network in various organizations

3. Specific Objectives and Contents

Specific Objectives	Contents
• Describe the basic concept of communications and Networking. • Understand the basic communication model • Identify the characteristics and the analyze the signals properties • Explain the network data processing in network's	**Unit I: Data Communication Fundamentals (4)** 1.17. Introduction of data Communication and Networking. 1.18. Communication Models 1.19. Signal: Analog and Digital Signal, Signal Characteristics: Frequency, Amplitude, Phase, Periodic Signal, Square Wave, Signal Propagation 1.20. Network: Network Models, Types of Network, Networked Data Processing: Centralized Processing, Distributed Processing, Client/Server Processing.

• Describe the communication modes. • Discuss different communications and transmission models • Explain data transmission characteristics of transmission media • Differentiate Circuit Switching and Packet Switching • Understand the techniques of converting data into signals	**Unit II: Data Transmission Mechanisms (8)** 2.16. Communication Modes: Simplex, Half-duplex, Full – duplex 2.17. Transmission Modes: Serial Transmission, Parallel Transmission 2.3. Transmission Media: Guided Media: Twisted Pair Cable, Coaxial Cable, Unguided Media: Microwave, Radio Wave, Infrared Wave 3.4. Introduction Switched Communication Network: Circuit Switching vs. Packet Switching, and message switching. 2.18. Data Encoding: Analog to Digital , Analog to Analog , Digital to Digital , Digital to Analog .
• Describe different network topologies with their strength and drawbacks. • Quantify performance of different transmission system. • Explain role and importance of protocol architecture • Describe the OSI Reference model and protocol.	**Unit III: Network Architectures (7)** 3.1. Network Topologies: Bus, Ring. Star, Tree, Mesh, Hybrid. 3.2. Network Performance: Bandwidth, Throughput, Latency. 3.3. Protocols: features (Syntax, Semantics & Timing), Protocol architecture and Importance, OSI Reference model and TCP/IP Protocol Suit.
• Describe evolution of internet and protocols used. • Apply and understand different computer addressees. • Understand different IP address classes. • Apply concept of Subnetting in efficient network design. • Differentiate TCP from UDP protocols. • Describe role of different Internet and application layer protocols	**Unit IV: Internet Protocols (10)** 4.16. Introduction: Evolution of Internet, History of the Internet Protocols, Internet Protocol Stack, 4.17. Computer Addresses: IP Address, MAC Address, Ports. 4.18. IP Addressing: Public and Private IP Addresses, Classes of IP Address. 4.19. Transport Layer protocols TCP (Transmission Control Protocols), UDP (User Datagram Protocols), 4.20. IP Support Protocols: ARP (Address Resolution Protocol), DHCP (Dynamic Host Control Protocol), ICMP (Internet Control Management Protocol) 4.21. Application Layer Protocols: Domain Name System (DNS), Email (SMTP, POP, IMAP), FTP, HTTP and VoIP
	Unit V: Error and Flow Control Techniques (5)
• Understand need and importance of flow control and error control • Exemplify different flow control techniques • Discuss different error detection techniques and compare them • Explain ARQ based error	5.1. Flow Control: Stop and Wait Protocol, Sliding Window Protocol 5.2. Error Detection: Parity Bits, Cyclic Redundancy Check (CRC), Hamming Distance 5.3. Error Correction: Stop-and-Wait ARQ, Go-Back-N ARQ. 5.4. Data Link Control Protocols: HDLC Frame Structure.

correction strategies	HDLC Operation
• Define Access protocols. • Describe working of different interconnecting devices. • Explain different layers in LAN protocol. • Discuss different variations of Ethernet. • Understand importance and architecture of wireless LANS	**Unit VI: Local area Networks (4)** 6.1. Access Protocols: CSMA/CD, CSMA/CA, Token Passing 6.2. Interconnecting devices: Hubs, L2 /L3 Switch, Bridge, Router and their Working & Comparisons. Repeater, Amplifier 6.3. Layered LAN Protocol, Physical layer, LLC Layer, MAC Layer. 6.4. Ethernet Variants: Standard Ethernet, Fast Ethernet, Gigabit Ethernet, 10Gb Ethernet, Standard Ethernet Physical Layer Implantation 6.5. Wireless LAN: Architecture, Bluetooth architecture
• Discuss different wide area network alternatives. • Describe SONET architecture and layers • Explain frame relay and ATM architecture and layers	**Unit VII: Wide Area Networks(4)** 7.1. SONET/SDH: Architecture, SONET Layers, SONET Frames, SONET Networks 7.2. Frame Relay: Architecture, Frame Relay Layers, Extended Addresses 7.3. ATM: Design Goals, Problems Architecture, Switching, ATM Layers, Congestion Control
• Exemplify frequency reuse principles in cellular networks • Discuss first second and third generation cellular telephony • Describe use of GEO, MEO and LEO	**Unit VIII: Cellular Telephony (3)** 8.1. Frequency Reuse Principle, Transmitting, Receiving, Roaming 8.2. First Generation Second Third Generation, Third Generation 8.3. Satellite Networks: Orbits, Footprints, Three Categories of Satellites: GEO, MEO & LEO

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

External evaluation

1. **End semester examination:**
   It is a written examination at the end of the semester. The questions will be asked covering all the units of the course.

   External Practical Evaluation:

   After completing the end semester theoretical examination, practical examination will be held. External examiner will conduct the practical examination according to the above mentioned evaluation. There will be an internal examiner to assist the external examiner. Three hours time will be given for the practical examination. In this examination Students must demonstrate the knowledge of the subject matter.

   Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.

Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.

Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:
- Lecture and Discussion

- Group work and Individual work
- Assignments
- Presentation by Students
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period. If a student fails to attend a formal exam/quiz/test, there won't be any provision for re-exam. Unless and until the student clears one semester he/she will not be allowed to study in the following semesters.

Laboratory Work

Students are recommended to perform the following tasks:

1. Cabling
2. Network set up in small lab
3. Sharing of h/w and s/w
4. Server configuration
5. Router configuration
6. IP configuration
7. DNS configuration
8. DHCP configurations

Prescribed Text

- William Stalling, Data and Computer Communications, Prentice Hall Publications, Tenth Edition, 2013

Reference

- **Andrew S. Tanenbaum & David J. Wetherall, Computer Networks, Prentice Hall, Fifth Edition, 2010**
- Behrouz A. Frouzen, Data Communications and Networking, McGraw-Hill, Fourth Edition, 2007

Course Title: Web Technology **Credit: 3**

Course No: CS.Ed.353 **Number of period per week: 3+3**

Nature of the Course: Theory + Lab Total **hours: 45+45**

Year: Third **Semester: Fifth**

Level: B. Ed. CSIT

1. Course Introduction

This course is introduced to provide some fundamental concepts' behind the web development and upon which the www is based. It provides the frame work to work on development field. It also introduced some fundamental differences between Client side scripting and server side scripting languages. This course includes the HTML,CSS, XHTML,XML, java script and some concept behind ruby on rail framework which are the very basic things which are used on web development.

2. Objectives: On completion of this course students should be able to:

- describe the components of the Internet and Web technology;
- explain the basics of Internet technology, such as http and the World Wide Web, HTML, XML, and Java Scripts;
- create WWW pages to serve as front-end to client/server, Internet applications;
- effect client-side programming using tools such as JavaScript

3. Specific Objectives and Contents

Specific Objectives	Contents
• Understand WWW and internet fundamentals • Explore the concepts of IP addresses and domain names • Explain HTTP and other application layer protocols	**Unit I: Web Fundamentals (5hr)** 1.21. Internet and its services, World Wide Web, URL, Web Server, Web Browser, Web Page, Web Site, Dynamic and Static Pages, ISP, W3C 1.22. IP addresses and Domain Names, Web Hosting and its Types 1.23. HTTP: Overview, Parameters, Messages, Requests, Response, Methods, Status Codes, Header Fields 1.24. Overview of FTP, SMTP, MIME, POP
• Understand HTML elements, tags and attributes • Discuss different HTML tags and their attributes • Apply HTML tags and attributes to design web pages • Create web pages having	**Unit II: Hypertext Markup Language (7 hr)** 2.19. HTML Overview, Tags, Elements, Attributes, Structures of HTML Documents 2.20. Basic Tags: Headings, Paragraph, Center, Line Break, Horizontal Line, Non-breaking Spaces, Pre 2.21. Formatting Tags, Phrase Tags, Meta Tag, Comments, Images, Tables, Lists 2.22. Hyperlinks (Text Links, Image Links, Email Links,

different layouts • Understand HTML Form and apply different attribut of From on web page.	Download Links), Intra-page Links, Frames, Iframes, Blocks, Background, Color, Fonts, Forms, Embedded Multimedia, Marquees, Header 2.23. HTML Layouts: Using Tables, DIV & Span Tags, HTML Style Sheets, HTML Entities, Events 2.24. HTML Forms: creating a single Line-Input Field on a Form, Creating Multiple Input Field on Form, placing check box on Form, placing Radio Buttons on a Form, placing a Drop Down list(selection menu) on a Form, Adding reset Botton on Form, Adding Submit Button on Form.
• Understand XHTML and HTML5 • Differentiate HTML from XHTML • Explain features of HTML5 and XHTML	**Unit III: XHTML & HTML5** **(6 hr)** 3.21. XHTML: Overview, Syntax, HTML vs. XHTML, Doctypes, Attributes, Validations, Events 3.22. HTML5: Overview, Features, Syntax, Document Structure, Web Forms 2.0, MathML, Canvas, Audio, Video, Events
• Understand concepts and importance of CSS and Web page designing • Apply different selectors while creating style sheets • Apply different formatting features with CSS • Explain CSS Box model, and dimensions	**Unit IV: Cascading Style Sheets** **(7 hr)** 4.22. Introduction, Advantages, Syntax, Inserting Style Sheets: Inline, Internal, External 4.23. Selectors: Type Selector, Universal Selector, Descendent Selector, Class Selector, ID Selector, Child Selector, & Attribute Selector, Grouping Selectors 4.24. CSS Colors, Background, Fonts, Text, Images, Links, Tables, Borders, Margins, Lists, Padding, Cursor, Outlines, Dimensions, Scrollbars, CSS Box Model 4.25. CSS Visibility, Positioning, Layers, Pseudo-classes and Pseudo-elements
• Understand role of java script in web page designing • Discuss syntax and features of java script • Apply java script in handling cookies and • Understand DOM tree and its traversal • Handle different events using java script	**Unit V: JavaScript** **(7 hr)** 5.13. Overview, Why Java Script?, Syntax, Variables, Operators, Screen Output and Keyboard Input, Selection Statements, Loops 5.14. Functions, Events, Handling Cookies, Page Redirect, Dialog Boxes 5.15. JavaScript Objects: Number, Boolean, String, Array, Date, Math, RegExp 5.16. Events & Event Handling, DOM, Element Access in JavaScript, DOM Tree Transversal & Modification
• Understand purpose of XML and XML tags • Discuss XML DOM and XML processing • Describe XML syntax, features and Validations • Create XML documents and	**Unit VI: Extensible Markup Language** **(8 hr)** 6.1. XML Overview and Syntax, XML Documents, XML Tags, Elements and Attributes, Comments, Character Entities, White Spaces, XML Processing, XML CSS, Encoding and Validation 6.2.XML DOM, XML Tree Structure, XML Namespaces, XML Processors

DTD • Write XML schema and understand its importance • Explore concepts behind Xpath, and XSLT	6.3. DTD Overview, Syntax, Components, Entities and Validations 6.4 XML Schema Overview, Syntax, Validation, Simple and Complex Types, String, Date Time, Numeric Types 6.5 X-path Overview, Expression, Nodes, Absolute and Relative Paths, Axes, Operators, Wildcard, Predicates 6.6 XSLT Overview, Syntax, template, value-of, for-each, sort, if, choose
• Discuss different web services and standards • Explain need and importance of server side scripting • Discuss Ruby and Ruby on Rails • Apply Rails for form processing and database manipulation	**Unit VII: Web Services & Server Side Scripting (5 hr)** 7.1. Web Services: Introduction, Characteristics, Components, Standards, Examples 7.2. Server Side Scripting Languages, Overview, Examples, Web Servers 7.3. Introduction of Ruby, Introduction to Rails Framework, Document Request, Sample Form Processing with Rails, Database Connectivity

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text
1. Robert. W. Sebesta, "*Programming the World Wide Web*", Fourth Edition, Pearson Education, 2007.

References
1. Deitel, Deitel, Goldberg, "*Internet & World Wide Web How To Program*", Third Edition, Pearson Education, 2006.
2. Jeffrey C.Jackson, "Web *Technologies--A Computer Science Perspective*", Pearson Education, 2006.
3. Kogent,*HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and JQuery*, Wiley

Course Title: Database Management Systems **Credit: 3**

Course No: CS.Ed.354 **Number of period per week: 3+3**

Nature of the Course: Theory + Lab **Total hours: 45+45**

Year: Third, Semester: Fifth

Level: BED.CSIT

1.Course Introduction

The purpose of this course is to introduce the fundamental concepts of database management system, including aspects of data models, database languages, and database design and its applicability in educational filed. At the end of this course, a student will be able to understand and apply the fundamental concepts required for the use and design of database management systems for different organizations.

2. Objectives

Through this course, students shall

- be able to understand the physical and logical aspect of database,
- be able to develop and design database schemas with necessary data integrity constraints,
- become knowledgeable in the creation, altering, and manipulation of tables, indexes, and views using relational algebra and SQL,
- become proficient at casting queries in SQL,
- and at writing database application programs with an understanding of transaction management, concurrency control, and crash recovery.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Define terms related to database management systems. • Understand the purpose of database management system. • Understand the concept of data abstraction and data independence. • Describe different data models and their usefulness. • Compare and contrast between DDL and DML. • Explain and database user's	**Unit I: Introduction to Database System (6)** 1.25. Data, Database, Database Management System. 1.26. Purpose of Database System 1.27. Views of Data: Data Abstraction, Database Schema and Instance, Data Models: (Hierarchical, Network, Entity Relationship, Relational, and object oriented data model). 1.28. Database Languages: DDL and DML 1.29. Database Users and Administrator 1.30. Database System Structure, Database Application Architecture, Classification of DBMSs

database systems structure.	
• Explain use and importance of ER model. • Use ER diagrams to design databases. • Learn concepts used in EER modeling • Explain concept behind Relational model. • Learn conversion of ER diagrams into Relational model.	**Unit II: Entity Relationship Data Modeling (6)** 2.25. ER Model and ER Diagrams, Components of ER Model, Types of Attributes. 2.26. Degree of Relationship, Constraints on ER Model (Mapping Cardinalities and Participation Constraints), Keys and Types of Keys, Weak Entity Sets. 2.27. Extended ER Modelling: Specialization and Generalization, Constraints on Specialization/Generalization, Aggregation. 2.28. Relational Model: Introduction, Structure of Relational Databases, Schema Diagram, Mapping ER Model to Relational Database.
• Use basic operations of relational algebra. • Discuss and use additional relational algebra operations and extended relational algebra operations. • Understand and use database modification through relational algebra. • Apply the concept behind NULL values.	**Unit III: Relational Algebra and Relational Calculus (8)** 3.23. Introduction of Relational Algebra (RA), Fundamental Operation of RA: Select Project, Set Union, Set Difference, Cartesian product and Rename Operations. 3.24. Additional Relational Algebra Operations: Set Intersection, Natural Join, Division and Assignment Operation. 3.25. Database Modification: Insert, Delete and Update Operation 3.26. Null Values.
• Explain structure of SQL queries. • Describe sting operations. • Understand concept behind join operations and nested queries. • Discuss and Use aggregate functions and sub queries. • Apply database modification statements. • Explain and use DDL statements. .	**Unit IV: Structured Query Language (7)** 4.26. Introduction: Basic Structure of SQL Query, SELECT, FROM and WHERE clause, Using single and Multiple Relations 4.27. Strings operations, Ordering the Display of Tuples, Join Operations: Join Types and Join Conditions. 4.28. Nested Queries: Set membership Test, Set Comparison and Test for Empty Relations. 4.29. Aggregate Functions (min, max, avg, sum, count), Aggregation with grouping: Group by Clause and Having Clause 4.30. Database Modifications: Insert, Delete and Update Operations 4.31. Data Definition Language: Domain Types in SQL, Create, Alter and Drop statements
• Understand importance of integrity constraints. • List and discuss different types of integrity constraints. • Use Integrity constraints for	**Unit V:Integrity Constraints (3)** 5.17. Concept and Importance of Integrity Constraints, Data Integrity. 5.18. Domain Constraints: Not Null Constraints, Unique Constraints, Primary key Constraints, Check

maintaining for achieving correctness of data. • Compare and contrast between assertions and triggers	Constraints. 5.19. Referential Integrity. 5.20. Assertions and Triggers: Creating and Deleting Assertions, Creating and Deleting Triggers, Assertions vs Triggers.
• Understand and exemplify functional dependencies. • Conceptualize the closure sets of FD. • Discuss and exemplify conversion of unnormalized relations into normalized forms. • Explain why normalization is needed?. • Understand losses decomposition.	**Unit VI: Relational Database Design (4)** 6.19. Introduction 6.20. Functional Dependencies (FDs), Types of FD's, FD Inference Rules. 6.21. Closure of Set of FD's, Closure of Set of Attributes, Covers. 6.22. Normalization: Purpose and Concept of Normalization, Forms of Normalization: 1-NF, 2-NF, 3-NF, BCN 6.23. Lossless Decomposition
• Understand the concept behind indexing. • Demonstrate different types of indices.	**Unit VII: Indexing(2)** 7.1.Concept of Indexing, 7.2.Types of Indices: Clustering Indices vs Nonclustering Indices, Primary vs Secondary Indices, Dense and Sparse Indices.
• Understand the concept of transaction. • Discuss and exemplify serial and serializable schedules. • Understand the problems behind concurrent execution of transactions • Describe and exemplify concurrency control techniques	**Unit VIII: Transaction Management (6)** 8.1.Transaction Concept 8.2.Properties of Transactions, Transaction State 8.3.Concurrent Executions, Schedules and Recoverability, Testing for Serializability. 8.4.Concurrency Control: Overview of Concurrency Control, Locking Techniques, Lock-Based Protocols, Timestamp-Based Protocols.
. • Classify different failures in db • Explain different database recovery techniques. • Understand the concept of buffer management and shadow paging. • Explain impact of failure of Non –volatile storage.	**Unit IX:Database Recovery(4)** 9.1.Failure Classification, 9.2.Log-Based Recovery Techniques: 9.3. Buffer Management: Checkpoints, Shadow Paging, 9.4.Failure with Loss of Non-volatile Storage.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination	40	Assignments	20%	40	Practical Report copy	25%	20
(Details are given in the separate table at the end)		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

- Silberschatz, H.F. Korth, and S. Sudarshan, Database System Concepts, 6th Edition, McGraw Hill, 2010

Reference

- Raghu Ramakrishnan, and Johannes Gehrke, Database Management Systems, 3rd Edition ,McGraw-Hill, 2007
- Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 6th Edition, Pearson Addison Wesley; 2010.

Course Title: Data Warehousing and Data Mining   **Credit: 3**
Subject code: CS.Ed.361   **Number of period per week: 3+3**
Nature of the Course: Theory + Lab   **Total hours: 45+45**
Year: Forth, Semester: Sixth
Level: B. Ed. CSIT

1. Course Introduction

Data warehousing and data mining are two major areas of exploration for knowledge discovery in databases. As more data is collected by businesses and scientific institutions alike,knowledge exploration techniques are needed to gain useful business intelligence. Data mining is for relatively unstructured data for which more sophisticated techniques are needed. The course aims to cover powerful data mining techniques including clustering, association rules, and classification.

2. Objectives

Upon completion of the course, the student should:
- $\rightarrow$ Be able to define and critically analyse data warehouse and mining approaches
- $\rightarrow$ Understand the technology of data warehousing.
- $\rightarrow$ Understand data mining concepts and techniques.
- $\rightarrow$ Be able to develop applications of higher order database systems.

3. Specific Objectives and Contents

Specific Objectives	Contents
	Unit I: Introduction (8 hr)
• Discuss data mining and KDD and their relationships	1.1. Data Mining Definition, KDD vs. Data Mining, KDD Process, Architecture of Data Mining Systems
• Describe data warehouse concepts and needs	1.2. Data Warehouse, Framework of Data Warehouse, Data Mining Functionalities, Classification of Data Mining Systems.
• Explain functionalities and applications of data mining	1.3. Integrating Data Mining with Data Warehouses and Databases, Data Mining Task Primitives, Data Mining Issues and Applications
• Demonstrate data pre-processing steps	1.4. Importance of Data Pre-processing, Data Summarization, Data Cleaning.
	Unit II: Data Warehouse and OLAP (12 hr)
• Understand differences between	2.29. Overview of Data Warehouse, Features of Data

OLAP and OLTP • Describe multidimensional data and their representation using cube • Demonstrate the different schema used for data warehouse representation • Apply DMQL to create data warehouse schema • Demonstrate different OLAP operations	Warehouse, Operational Database Systems vs Data Warehouse, Need of Separate Data Warehouse. 2.30. Multidimensional Data Model and Data Cube, Schema for Multidimensional Data-Star Schema, Snowflake Schema, Fact Constellation Schema 2.31. DMQL introduction and Syntax, Defining Multidimensional schema by using DMQL, Measures and Its Categories, Using DMQL for finding Measures 2.32. Concept Hierarchies, OLAP Operations- Roll-up, Drill-down, Slicing, Dicing, Pivoting 2.33. Data Warehouse Architecture, Data Warehouse Models, Data Warehouse Backend Tools and Utilities, Metadata, Types of OLAP Servers
• Understand need and importance of association mining • Demonstrate the use of Apriori and FP-Growth algorithms in finding frequent item sets • Use above mentioned algorithms to generate association rules	**Unit III: Association Mining (9Hrs)** 3.27. Frequent Item Sets, Closed Item Sets, Association Rules, Support & Confidence 3.28. Finding Frequent Item Sets by using Apriori Algorithm, Mining Association Rules from Frequent Items, Improving Efficiency of Apriori Algorithm 3.29. Finding Frequent Item Sets by using FP-Growth Algorithm, Generating Association Rules
• Understand need and importance of classification and prediction • Apply classification algorithms to find class labels • Apply prediction algorithms to make predictions	**Unit IV: Classification and Prediction (9 Hrs)** 4.32. Defining Classification and Prediction, Comparison of Classification and Prediction 4.33. Classification by Decision Trees, Naive Bays Classification, Rule Based Classification, Support Vector Machines 4.34. Prediction-Linear and Non-linear Regression, Accuracy and Error Measures, Evaluating Accuracy of Classifiers and Predictors, Ensemble Methods
• Explain use of data mining techniques in different areas • Define text mining and text mining	**Unit V: Advanced Data Mining Concepts (7Hrs)** 5.1 Mining Data Streams, Graph Mining, Social Network Analysis, Multi-relational Data Mining 5.2 Text Mining, Web Mining, Object Mining, Spatial Data Mining, Multimedia Data Mining.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	60	Quizzes	10%	20	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	60	Total Internal	100%	20		100%	20
Full Marks 60+20+20 = 100							

Prescribed Text

- Data Mining Concepts and Techniques, Morgan Kaufmann J. Han, M. Kamber Second Edition

References

- Data Warehousing in the Real Worlds, Sam Anahory and Dennis Murray, Pearson Edition Asia.
- Data Mining Techniques – Arun K. Pajari, University Press.

Course Title: Computer organization and architecture   **Credit: 3**
 Subject code: CS.Ed.362   **Number of period per week: 3+3**
Nature of the Course: Theory + Tutorial   **Total hours: 45+45**
Year: Third , Semester: Sixth

Level: B. Ed. CSIT

1. Course Introduction

In this course the term architecture is taken to include instruction set architecture (the programmer's abstraction of a computer), organization or micro architecture (the internal implementation of a computer at the register and functional unit level), and system architecture (the organization of the computer at the cache, and bus level).

2. Objectives

At the end of this course the students should be able to:

- Understand computer representation of data
- Demonstrate algorithms used to perform different operations on the data
- Describe different operations in terms of Micro-operations
- Describe architecture of basic computer
- Understand micro-programmed control unit
- Describe and memory and I/O organization of a typical computer system

3. Specific Objectives and Contents

Specific Objectives	Contents
• Understand how numbers and text can be represented in digital form and their limitations. • Understand concept of overflow and detection of overflow. • Appreciate how errors can be detected using parity bits.	**Unit I: Data Representation (4)** 1.31. Data Representation: Binary Representation, BCD, Alphanumeric Representation, Complements, Fixed Point representation, Representing Negative Numbers, Floating Point Representation, Arithmetic with Complements, Overflow, Detecting Overflow 1.32. Other Binary Codes: Gray Code, self Complementing Code, Weighted Code, Excess-3 Code, EBCDIC 1.33. Error Detection Codes: Parity Bit, Odd Parity, Even parity, Parity Generator & Checker
• Understand register transfer language • Describe arithmetic, logic and shift operations in terms of microoperations. • Build circuit diagrams of arithmetic, logic and shift operations.	**Unit II: Register Transfer and Microoperations (6)** 2.34. Overview: Microoperation, Register Transfer Language, Register, Register Transfer, Control Function 2.35. Arithmetic Microoperations: Binary Adder, Binary Adder-Subtractor, Binary Incrementer, Arithmetic Circuit 2.36. Logic Microoperations, Hardware Implementation, Applications of Logic Microoperations. 2.37. Shift Microoperations: Logical Shift, Circular shift, Arithmetic

	Shift, Hardware Implementation of Shifter.
• Learn computer organization and architecture using hypothetical computer system. • Describe Common bus system of basic computer. • Interpret instruction set of basic computer • Describe interrupt cycle of basic computer • Understand overall execution cycle of basic computer	**Unit III: Basic Computer Organization and Design (7)** 3.30. Instruction Code, Operation Code, Stored Program Concept 3.31. Registers and memory of Basic Computer, Common Bus System for Basic Computer. 3.32. Instruction Format, Instruction Set Completeness, Control Unit of Basic Computer, Control Timing Signals 3.33. Instruction Cycle of Basic computer, Determining Type of Instruction, Memory Reference Instructions, Input-Output Instructions, Program Interrupt & Interrupt Cycle. 3.34. Description and Flowchart of Basic Computer
• Understand microprogram and microprogrammed control unit • Describe microprogram sequencer • Design microprogrammed control unit	**Unit IV: Microprogrammed Control(4)** 4.35. Control Word, Microprogram, Control Memory, Control Address Register,Sequencer 4.36. Address Sequencing, Conditional Branch, Mapping of Instructions, Subroutines, Microinstruction Format, Symbolic Microinstructions 4.37. Design of Control Unit
• Understand different CPU organizations • Describe types of instructions on the basic of number of operands • Interpret operand using addressing modes. • Compare and Contrast RISC and CISC computer architectures	**Unit V: Central Processing Unit (4)** 5.21. Major Components of CPU, CPU Organization (Single Accumulator Organization, General Register Organization, Stack Organization) 5.22. Instruction Formats, Addressing Modes, Data Transfer and manipulation, Program Control, Subroutine Call and Return, Types of Interrupt 5.23. RISC vs CISC, Pros and Cons of RISC and CISC Overlapped Register Windows
• Describe addition, subtraction, multiplication and division algorithm for signed magnitude data • Demonstrate addition, subtraction and multiplication algorithm for signed 2's complement data • Understand hardware implementation of all described algorithms	**Unit VI: Computer Arithmetic (4)** 6.1 Addition and Subtraction with Signed Magnitude Data (Hardware Implementation and Algorithm), Addition and Subtraction with Signed 2's Complement Data 6.2Multiplication of Signed Magnitude Data (Hardware Implementation and Algorithm), Booth Multiplication (Hardware Implementation and Algorithm) 6.4 Division of Signed magnitude Data (Hardware Implementation and Algorithm), Divide Overflow
• Understand interface between I/O devices and CPU. • Compare strobe and handshaking mechanism of data transfer • Describe modes of data transfer along with their pros and cons • Explain methods of handling prioritized interrupts • Differentiate DMA from input-output processors	**Unit VII: Input Output Organization (4)** 7.1 Input-Output Interface: I/O Bus and Interface Modules, I/O vs Memory Bus, Isolated vs Memory-Mapped I/O 7.2. Asynchronous Data Transfer: Strobe, Handshaking (Source and Destination Initiated) 7.3. Modes Of Transfer: Programmed I/O, Interrupt-Initiated I/O, Direct memory Access 7.4. Priority Interrupt: Polling, Daisy-Chaining, Parallel Priority Interrupt 7.5. Direct Memory Access, Input-Output Processor, DMA vs

	IOP .
• Understand why a memory hierarchy is necessary to reduce the effective memory latency. • Appreciate that most data on the memory bus is cache refill traffic • Describe techniques of mapping data stored in RAM to the data in cache memory	**Unit VIII: Memory Organization (4)** 8.1 Memory Hierarchy, Main Memory, RAM and ROM Chip Memory address Map, Memory Connection to CPU, Auxiliary Memory (magnetic Disk, Magnetic Tape) 8.2 Associative Memory: Hardware Organization, Match Logic, Read Operation, Write Operation 8.3 Cache Memory: Locality of Reference, Hit & Miss Ratio, Mapping (Direct, Associative, Set Associative), Write Policies(Write-Back, Write-Through)

Evaluation System

External Evaluation	Marks	Internal Evaluation	Weight age	Marks
End semester examination		Assignments	20%	
(Details are given in the separate table at the end)		Quizzes	10%	
		Attendance	20%	
	60	Internal Exams	50%	40
Total External	60	Total Internal	100%	40

References

- *William Stallings,* "Computer Organization and Architecture", Prentice-Hall of India, Pvt. Ltd., Seventh edition, 2005.
- *Vincent P. Heuring and Harry F. Jordan*, "Computer System Design and Architecture", Prentice-Hall of India, Pvt. Ltd., Second edition, 2003.

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Computer Graphics **Credit: 3**

Course No: CS.Ed.363 **Number of periods per week: 3+3**

Nature of the Course: Theory + Lab **Total hours: 45+45**

Year: fourth, **Semester: Sixth**

Level: B. Ed. CSIT

1. Course Introduction

This course provides introduction to computer graphics algorithms, software and hardware. Topics include: description of different IO devices used in displaying graphics, algorithms for drawing different output primitives, 2D and 3D transformations, techniques of hidden surface removal, surface rendering methods, and color models.

2. Objectives

Through this course, students shall

- have a knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
- be able to use C and OpenGL for Graphics Programming
- have algorithmic understanding of output primitives and 2D geometrical transformations.
- be able to represent 3D geometrical objects and transform them
- have a knowledge and understanding of techniques of hidden surface removal, surface rendering and color models.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Exemplify application areas of computer graphics • Describe visualization of images and colors in monitors	**Unit I: Computer Graphics Hardware** **(5)** 1.34. Introduction, Application Areas of Computer Graphics, Frame Buffer and Display Buffer, Stair Case Effect 1.35. Graphics Devices: Cathode Ray Tube, Raster and Random Scan Displays, CRTs for Color Display, Beam Penetration CRT, The Shadow - Mask CRT, Direct View Storage Tube.
• Apply C Library functions in drawing graphics • Explain importance of OpenGL in Graphics Programming • Use OpenGL for Graphics programming	**Unit II: Computer Graphics Software** **(5)** 2.38. C Graphics Basics: Graphics programming, initializing the graphics, C Graphical Functions, Simple Programs using Library Functions. 2.39. Introduction to OpenGL: Basic OpenGL Syntax, Related Libraries, Header Files, Display-Window

	Management Using GLUT, A Complete OpenGL Program, Error Handling in OpenGL
	2.40. Coordinate Reference Frames, Screen Coordinates Absolute and Relative Coordinate Specifications, Specifying A Two-Dimensional World-Coordinate Reference Frame in OpenGL, OpenGL Point Functions, OpenGL Line Functions, OpenGL Curve Functions
• Explain Line drawing algorithms and Implement them. • Discuss circle and ellipse generating algorithms and implement them. • Demonstrate Filling Algorithms by writing Programs	**Unit III: Output Primitives** **(6)** 6.24. Line Drawing Algorithms: Line Equation, DDA algorithm, Bresenham's Algorithm, Displaying Polylines 6.25. Circle Drawing Algorithm: Properties of Circle, Mid-point Circle Algorithm 6.26. Ellipse Generating Algorithms: Properties of Ellipse, Mid-point Ellipse Algorithm 6.27. Filing Algorithms: Scan-Line Filling Algorithm, Boundary Filling Algorithm
• Apply transformations such as translation, rotation, scaling, reflection and shear to images. • Use homogeneous coordinate system to represent geometrical transformations • Explain need and process of world to view-port coordinate transformation.	**Unit IV: 2D Transformations Clipping & Windowing(8)** 3.35. Transformations: Basic Transformations (Translation. Rotation, Scaling), Other Transformations(Reflection, Shear), Matrix Representations and Homogeneous Coordinates 3.36. Composite Transformations: Translation, Rotation, Scaling General Pivot-point Rotation, General Fixed-point Scaling, Affine Transformation 3.37. 2D Viewing: Viewing Pipeline, Viewing coordinate Refrence Frame, Window to Viewport Coordinate Transformation
• Able to represent 3D objects using different data structures. • Describe Bezier curves and B-splines used to represent curved surfaces. • Explain 3D transformations and use homogeneous coordinate system to represent it.	**Unit V: 3D Concepts & Transformations** **(8)** 4.38. 3D Object Representations: Polygon Surfaces (polygon Tables, Plane Equations, Polygon Meshes), Bezier Curve and Surfaces, B-Splines. 4.39. 3D Transformations: Basic Transformations (Translation, Scaling, Rotation), Other Transformations (Shear, Reflection), General 3D Rotations, Fixed Point Scaling, Composite Transformations.
• Understand the concepts behind visible surface detection and classify the techniques. • Explain image space methods used for visible surface detection. • Describe object space methods	**Unit VI: Visible Surface Detection** **(5)** 5.24. Classification of Visible-Surface Detection Algorithms: Object Space Methods, Image Space Methods 5.25. Object Space Methods: Blackface Detection, 5.26. Image Space Methods: Depth-Buffer Method, A-Buffer Method. 5.27. Hybrid Methods: Depth-Sorting Method, Area Sub-

and hybrid methods in detecting visible surfaces.	division method, Octree Method
• Discuss different light sources and their applications in surface rendering • Explain illumination models and compare them • Discuss different algorithms used in rendering polygon surfaces	**Unit VII: Surface Rendering Methods** **(4)** 7.1 Light Sources: Point Source, Distributed Light Source, Diffuse Reflection, Specular Reflection 7.2 Illumination Models: Ambient Light, Diffuse Reflection, Specular Reflection. 7.2 Polygon Rendering Methods: Constant Intensity Shading, Gouraud Shading.
• Use & explain different models used in generating colors and their applications • Describe conversion between RGB and HSV color model	**Unit VIII: Color Models and Applications(4)** 7.9. Properties of Light, XYZ Color Model and CIE Chromaticity Diagram 7.10. Color Models: RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model 7.11. Conversion between HSV and RGB Models, Color Selection and Applications

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 **=** 100							

Prescribed Text

- ***Donald Hearn and M. Pauline Baker***, *Computer Graphics C Vesrion*, Second Edition, Pearson Education, 2003.
- ***Donald Hearn and M. Pauline Baker***, *Computer Graphics with OpenGL*, Fourth Edition , Prentice Hall, 2010.

References

- ***James D. Foley, Andries van Dam, Steven K. Feiner, and John F. Hughes***, *Computer Graphics: Principles and Practice*, Third Edition, Addison-Wesley, 2013
- *Dave Shreiner*, *Graham Sellers* , *John M. Kessenich*, *Bill M. Licea-Kane*, *OpenGL Programming Guide: The Official Guide to Learning OpenGL*, 8th Edition, 2013

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Management Information Systems   **Credit: 3**

Course No: CS.Ed.364   **Number of period per week: 3+3**

Nature of the Course: Theory + Case Study   **Total hours: 45+45**

Semester: Sixth

Level: B.ED. CSIT

1. Course Introduction

This course introduces information systems that are used for organizational decision making & problem solving. It discusses the significant managerial aspects of treating information as an organizational resource and its increasing impact on today's organization. Besides this, it will include topic of ethical, social and political issues of IS, securing information systems, enhancing decision making, and project management.

2. Objectives

By the end of this course, it is expected the student will be able to

- → Highlight information systems and their effectiveness in organization success
- → Understand types of MIS applications in organisations
- → To provide concepts of new ethical issues, security threats, information system development process
- → Analyze the business issues, processes, and techniques associated with organizational information systems;
- → Select and design MIS systems appropriate to meet management requirements.
- → Critically evaluate MIS contributions to the strategic management of organisations
- → Identify project management tools, techniques and risks

3. Specific Objectives and Contents

Specific Objectives	Contents
• Discuss the role of information system. • Understand trends in MIS, Challenges & opportunities due to globalization. • Discus Data vs Information, information system and information technology.	**Unit I: Information Systems in Global Business (6)** 1.1. Role of Information Systems in Business, How Information Systems are Transforming Business. 1.2. New trends in MIS, Globalization Challenges and Opportunities, Emerging Digital Firm. 1.3. Data vs Information, Information System, Information technology, Dimensions of IS, Contemporary approaches to IS.
• Understand role of information	**Unit II: Business and Information Systems (10)** 2.41. Business Processes, Use of Information Technology to

systems to enhance business process • Explore information systems used in different organizational levels & functional areas • Conceptualize role of enterprise applications and collaboration systems in business firms • Define the Enterprise Systems, supply chain management.	Enhance Business Process 2.42. Systems for Different Management Groups: Transaction Processing Systems, Management Information Systems, Decision Support Systems, Executive Support Systems 2.43. Systems for Different Functional Areas: Finance and Accounting Systems, Sales and Marketing Systems, HR Systems, Manufacturing and Production Systems 2.44. Systems for Linking Enterprise: Enterprise Systems, Supply Chain Management Systems, Customer Relationship Systems, Knowledge Management Systems
	Unit III: Information Systems & Organizational Strategy(7)
• Understand Organization and Impact of IS in Organizations • Discuss competitive advantages of using information systems. • Explain Business value chain and impact of internets in competitive advantages	4.40. Definition of Organization, Features of Organization, Impact of IS on Organization and Business Firms 4.41. Information Systems and Competitive Advantages, Porters Competitive Force Model, Using Information System to Deal with Competitive Forces, Impact of Internet on Competitive Advantages. 4.42. Business Value Chain Model, The Value Web, Synergies, Core Competencies and Network Based Strategies,
	Unit IV: Ethical & Social Issues Related to IS (7)
• Relate ethical issues with society and politics • Understand the types of ethical issues raised due to growth of information systems & internet • Describe & exemplify moral dimensions of information age • Identify some ethical dilemmas created due to information systems	5.28. Understanding Social and Ethical Issues: Ethics, Relationship between Ethical, Social and Political Issues, Moral Dimensions of Information Age, Technology trends that raises Ethical Issues 5.29. Ethics in Information Society: Responsibility, Accountability & Liability, Ethical Analysis, Some Real World Ethical Dilemmas 5.30. MIS Hands-on Project: Analyzing Privacy and other Ethical Issues by Analyzing Data, Business Case
	Unit V: Securing Information Systems (7)
• Describe the reasons behind vulnerabilities of information systems • Understand business value of security & control • Identify & explain different tools used for protecting organizational information	5.1. Why Systems are Vulnerable, Internet Vulnerabilities, Wireless Security Challenges, Malicious Software, Hackers and Computer Crime, Software Vulnerabilities 5.2. Business value of Security and Control, Legal and Regulatory Requirements for Electronic Record Management, Electronic Evidence and Computer Forensic. 5.3. Information System Control, Risk assessment, Security Policy, Disaster Recovery and Business Continuity Planning, Role of Auditing 5.4. Access Control, Firewalls, Intrusion Detection Systems, Antivirus Software, Securing wireless Networks.
	Unit VI: Enhancing Decision Making (8)
• Understand different types of decisions and decision making process	6.28. Decision Making and Information Systems: Business Value of Improved Decision Making, Types of Decisions, Decision Making Process, Managers and Decision

• Demonstrate the role of DSS, MIS and ESS is Decision making • Discuss importance of GDSS and ESS in firms			Making 6.29. Systems for Decision Support: Management Information Systems, Decision Support Systems, Executive Support Systems, Web Based Customer Decision Support Systems, Group Decision Support Systems 6.30. ESS and Balanced Scoreboard Framework, Role of ESS in the Firm, Business value of ESS				

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	60	Quizzes	10%	20	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	60	Total Internal	100%	20		100%	20
Full Marks 60+20+20 = 100							

Prescribed Text

- *Laudon, K. C. & Laudon, J. P.,* Management Information Systems, 12th Edition Pearson, 2013
- *James A. O'Brien, George Marakas*,Management Information Systems, 7th Edition McGraw-Hill Companies, 2006
- *R. Kelly Rainer, Efraim Turban, Richard E. Potter*,Introduction to Information Systems: Supporting and Transforming Business, Wiley, 1st Edition, 2006

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Java Programming   **Credit: 3**
 Course No. CS.Ed.471
Nature of the Course: Theory + Lab   **Total hours: 45+45**
Year: Fourth,   **Semester: Seventh**
Level: B. Ed. CSIT

1. Course Introduction
This course introduces the fundamental programming concepts and techniques in Java. All elements of object-oriented programming are introduced. Topics covered include control structures, classes and objects, dynamic memory allocation, Inheritance and Polymorphism, File Handling, Multithreading, Exception Handling, and Generic Programming.

2. Objectives
Upon completion of this course students should:
- → Understand the basic concepts and principles of object oriented programming.
- → Be able to design, write and test a Java program to implement a working solution to a given problem specification.
- → Be able to deal with exceptions effectively and write multithreaded programs

3. Specific Objectives and Contents

Specific Objectives	Contents
	Unit I: Java Programming Basics (5 Hrs)
• Understand importance of java technology • Setup java environment and get ready for coding • Compile and Execute java programs	1.5. History of java, Characteristics of java, Architecture of java 1.6. PATH and CLASSPATH Variables, Structure of Java Programs, Compiling & Running Java Programs 1.7. Review of Data Types, Comments, Operators, Variables, Converting between Data Types (Type Casting), Strings, Arrays, Constants
	Unit II: Control Flow (4 Hrs)
• Use decision statements in programs • Demonstrate looping statements and program them • Apply jump statements in programs	2.45. Selection Statements: if statements, if....else statements, else if ladders, switch statements 2.46. Looping: While Loop, Do While Loop, For Loop, Enhanced For Loop 2.47. Jump Statements: Break Statement, Continue Statement, Return Statement
	Unit III: Class and Objects (6 Hrs)
Understand class and objects and develop programs around it. Use access Specifiers properly to class members	3.38. Creating Classes, Defining member variables and methods, Creating Reference Variables, Creating Objects, Using member variables and methods 3.39. Access Specifiers: Public, Protected, Default, and

Exemplify static data members and methods Understand constructors and use it in programs Pass arguments and return values from methods	Private 3.40. Static and Non-static members, Constructors, This Keyword, Garbage Collection, Inner Classes, Local Classes 3.41. Passing Parameters, Arrays, Objects to Methods and Constructors, Returning Values, Arrays, Objects from Methods and Constructors
• Write polymorphic programs using overloading and overriding • Understand importance of inheritance and use it in writing programs • Explain concepts of containership and abstract classes	**Unit IV: Inheritance and Polymorphism (7 Hrs)** 4.43. Method Overloading, Constructor Overloading, Creating Subclass, Different Types of Inheritance 4.44. Method Overriding, Dynamic Method Dispatch, Using Constructors and Inheritance, Super Keyword 4.45. Access Specifiers and Inheritance, Final Methods, Final Classes 4.46. Has-a Relationship (Containership), Object Class, Abstract Classes
• Understand interfaces and use it in programs • Differentiate between interfaces and abstract classes. • Demonstrate packages by creating and using it.	**Unit V: Interfaces and Packages(5 Hrs)** 5.31. Defining Interfaces, Interfaces vs. Classes, Extending Interfaces, Implementing Interfaces, Multiple Inheritance by using interfaces, Abstract Classes vs. Interfaces. 5.32. Importance of Packages, Using Packages, Creating Packages
• Read inputs from files and store outputs in files. • Understand and use byte stream classes and character stream classes • Use random access and tokenizer in files	**Unit VI: File and IO Handling (6 Hrs)** 6.31. Concept of IO Streams, File Class, InputStream and OutputStream Class, FileInputStream and FileOutputStream Class, BufferedInputStream and BufferedOutputStream Class 6.32. Reader and Writer Classes, FileReader and FileWriter Class, InputStreamReader and OutputStreamWriter Class, BufferedReader and BufferedWriter Class, 6.33. Random File Access, StreamTokenizer Class, Using PrintWriter Class, Using Scanner Class
• Understand exceptions and its categories • Hand exceptional conditions in programs by using different keywords • Define own exception classes and use them in exception handling	**Unit VII: Exception Handling (6 Hrs)** 7.12. Concept of Exception and Exception Handling, Categories of Exceptions, Hierarchy of Exception Classes 7.13. Using Try....Catch, Multiple Catch Blocks, Finally Keyword 7.14. Using Throws and Throw Keywords, Nested Try....Catch, Creating Exception Classes
• Explain importance of multithreaded programs • Use Runnable interface and	**Unit VIII: Multithreading (6Hrs)** 8.1. Concept of Thread and Multithreading, Main Thread, Naming a Thread, Pausing a Thread, Thread Life

Thread class in creating threads	Cycle
• Understand thread life cycle and manage multithreaded programs by using different methods.	8.2. Multithreading by Using Runnable Interface, Multithreading by using Thread Class, Creating multiple threads, Joining Threads, setting Thread Priority, Stopping Threads
	8.3. Thread Synchronization, Communication between Threads, Suspending and Resuming Threads

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

– Cay S. Horstmann, Core Java Volume I--Fundamentals Ninth Edition, Prentice Hall, 2012

References

– Hebert SchildtJava: The Complete Reference, McGraw-Hill Education, Ninth Edition, 2014
– Steven Holzner, Java 7 Programming, Black Book, Dreamtech Press, 2013

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Advanced Database Design   **Credit: 3**
 Course No. CS.Ed.472
Nature of the Course: Theory + Lab   **Total hours: 45+45**
Year: Forth,   **Semester: seventh**
Level: B. Ed. CSIT

1. Course Introduction

Advanced database design is the course that focuses on principles and algorithms of designing database management systems. This course covers concepts of file structures, indexing, query processing and optimization techniques used by database management systems. Besides this, course has given emphasis on techniques of handling transaction, concurrency, and recovery.

2. Objectives

Upon completion of the course, the student can:

→ Understand techniques and algorithm used in DBMS design
→ Demonstrate each techniques and algorithm used in DBMS design.
→ Optimize queries by creating alternative evaluation plans.
→ Develop small scale DBMS.

3. Specific Objectives and Contents

Specific Objectives	Contents
	Unit I: Storage and File Structures (8 hr)
• Understand access characteristics of disks and performance parameters • Discuss role of buffer manager in performance of DBMS' • Exemplify different file organization used by database management systems	1.8. Physical Storage Media: Memory Hierarchy, Physical Characteristics of Disks, Performance Measures of Disks, Optimization of Disk Block Access, RAID 1.9. Storage Access, Buffer Manager, Buffer Replacement Policies 1.10. File Organization: Fixed Length Records, Variable Length Records, Organization of Records in Files, Data Dictionary Storage
	Unit II: Indexing and Hashing (8 hr)
• Understand need and importance of indices • Discuss different type of indices critically • Explain hashing and its applications critically	2.48. Basic Concepts, Types of Indices, Factors for Evaluating Indices, 2.49. Ordered Indices, Primary Indices (Dense and Sparse), Multilevel Indices, Index update, Secondary Indices, Secondary Indices, B+ Tree Index 2.50. Static Hashing, Hash File Organization, Hash Functions, Bucket Overflow handling, Hash Indices, Dynamic Hashing, Index definition in SQL
	Unit III: Query Processing (8 Hrs)

• Understand steps of query processing • Exemplify algorithms used in performing different SQL operations • Discuss and exemplify process of evaluating SQL expressions	3.42. Steps Involved in Query Processing, Measure of Query Cost 3.43. Select Operation: Basic Algorithms, Selection using indices, Selection involving comparisons, Implementation of Complex Selections 3.44. Join Operation: Nested Loop Join, Block Nested Loop Join, Indexed Nested Loop Join 3.45. Other Operations: Duplicate Elimination, Projection Set Operations, Outer Join, Aggregation 3.46. Evaluation of Expressions, Materialized Evaluation, Pipelining Evaluation
• Discuss importance of optimizing queries • Exemplify size estimation of relations and its use in query optimization • Demonstrate transformation rules used in query optimization • Understand and compare cost base and heuristic query optimization	**Unit IV: Query Optimization (8 Hrs)** 4.47. Basic Concepts, Estimating Statistics of Expression Result, Catalog Information 4.48. Selection Size Estimation, Join Size Estimation, Size Estimation of other operations, Estimating Number of Distinct Values 4.49. Transformation of Relational Expressions, Equivalence Rules, Examples of Transformations 4.50. Cost Based Query Optimization, Heuristic Query Optimization, Optimization of Nested Queries
• Understand basic concept of transaction and interleaved processing • Discuss need of serailizable schedules • Exemplify serializability test procedure	**Unit V: Transaction Management (4 Hrs)** 5.33. Basic Concepts, ACID Properties, Transaction States, Concurrent Execution 5.34. Schedules, Types of Schedule on the Basis of Serializability, Testing Conflict Serializability, Types of Schedule on the Basis of Recoverability 5.35. Commit and Rollback
• Understand need of concurrency control • Discuss different protocols used in controlling concurrency and exemplify each of them • Exemplify techniques of handling deadlocks	**Unit VI: Concurrency Control(5 Hrs)** 6.34. Lock Based Protocols, Timestamp Based Protocols, Thomas write Rule 6.35. Validation Based Protocols, Granularity, Multiversion Protocols 6.36. Deadlock Prevention (wound-wait and wait-die), Deadlock Detection, Recovery from Deadlocks
• Discuss need of recovery techniques • Exemplify log based recovery schemes • Explain shadow paging technique of recovery	**Unit VII: Recovery System(4 Hrs)** 6.37. Types of Failures, Recovery Schemes, Log File, Write Ahead Logging 6.38. Log Based Recovery Techniques (undo/redo, no-undo/redo, undo/no-redo), Check pointing, Shadow Paging 6.39. Recovery in concurrency

Laboratory Work

Student should practice creation, modification and removal of indexes, need to implement different algorithms used for SQL operations. Students also need to practice query optimization schemes, transaction management, concurrency control algorithms, and recovery techniques.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

- **Database System Concepts,** by Abraham Silberschatz,, Henary Korth, S. Sudarshan, McGraw-Hill Education, Sixth Edition, 2010
- Raghu Ramakrishnan, and Johannes Gehrke, Database Management Systems, 3rd Edition ,McGraw-Hill, 2007
- Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 6th Edition, Pearson Addison Wesley; 2010

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Introduction to E-Commerce   **Credit: 3**
 Course No. CS. Ed. 473
Nature of the Course: Theory + Case Study   **Total hours: 45+45**
Year: Forth,   **Semester: Seventh**
Level: B. Ed. CSIT

1. Course Introduction
This course includes examining different aspects of conducting business over the internet. The discussion covers different e-business models. Besides this, the course covers several topics including different E-Payment systems, online marketing and advertising systems, and different social, ethical, political issues, and legal scenario.

2. Objectives
Upon completion of this course students should be able to:
→ Demonstrate an awareness of the key components and concepts of e-commerce, and the vital role it plays in modern business practice.
→ Understand the need for payment methods for conducting transaction over the e-commerce transactions.
→ Identify the components that comprise an e-Business strategy and demonstrate understanding of methods for devising such a strategy
→ Understand the importance and relevance of E-Advertising and E-Marketing in the current global and local business scenarios.

3. Specific Objectives and Contents

Specific Objectives	Contents
	Unit I: Introduction of E-Commerce (6 hr)
• Define ecommerce, e-business and other terminologies	1.11. Definition of Ecommerce, Ecommerce vs Traditional Commerce, E-business, Different between ecommerce and E-business.
• Demonstrate different e-business models	1.12. Why Ecommerce, Basic Terminologies: E-shop, E-mall, E-market etc, Benefits and Limitations of Ecommerce
• Exemplify M-commerce and other emerging business models	1.13. Ecommerce Framework, Unique Features of E-Commerce, Types of Ecommerce: B2B, B2C, C2C, C2B
• Understand the concepts of EDI and its working	1.14. M-Commerce, E-Commerce vs M-Commerce, Features of M-Commerce,
	1.15. Electronic Data Interchange: Defining EDI, EDI vs

	Email, Benefits of EDI, Limitations of EDI, Working of EDI
• Identify different traditional and ecommerce payment systems • Describe the working of different e-payment systems • Explain requirements and risks associated with payment system • Demonstrate services provided by payment gateways	**Unit II: E-Commerce Payment Systems (6 hr)** 2.51. Types of Payment Systems: Cash, Checks, Credit/Debit Cards. 2.52. E-Commerce Payment Systems: E-cash, E-check, Online Credit Card Payment, Digital Wallet, Smart Card Based Payment Systems, Strengths and Drawbacks of each Payment System 2.53. Mobile Payments, Internet Banking, Digital Payment Requirements, Risk and E-Payment Systems, 2.54. Payment Processing, Payment Gateways, Case Study on e-Sewa and PayPal
• Understand the elements of business models and classify different business models. • Demonstrate different B2C business models. • Exemplify major B2B business models. • Identify emerging business models and demonstrate each of them • Discuss impact of ecommerce in organization restructuring	**Unit III: Ecommerce Business Models (6 Hrs)** 3.47. Introduction of E-Commerce Business Models, Key Elements of Business Models, Categorization of E-Commerce Business Models 3.48. Major B2C Business Models: Portal, E-tailer, Content Provider, Transaction Broker, Market Creator, Service Provider, Community Provider. 3.49. Major B2B Business Models: E-distributor, E-procurement, Exchanges, Industry Consortia, Private Industrial Networks 3.50. Emerging E-Commerce Business Models: Consumer-to-Consumer (C2C) Business Models, Peer-to-Peer (P2P) Business Models, M-commerce Business Models 3.51. Impact of Internet and Web in Structurture, Strategy and Process of Organizations, Case Study of some E-Commerce Site
• Indentify different mechanism for discovering behaviors of online consumers • Discuss concepts and importance of marketing • Understand and demonstrate different internet marketing techniques and strategies	**Unit IV: E-Commerce Marketing and Advertising (6 Hrs)** 4.51. Consumers Online: The Internet Audience, Internet Traffic Pattern, Consumer Behavior Models, Profiles of Online Consumers, The Online Purchasing Decision, A Model of Online Consumer Behavior, Browsers and Buyers, Finding Vendors Online, Why More People Don't Shop Online, Trust, Utility and Opportunism in Online Markets 4.52. Basic Marketing Concepts: Feature Sets, Products, Brands and the Branding Process, Segmenting, Targeting, and Positioning, Brands Rationale, Brands

	and Price Dispersion on the Internet
• Explain B2B and B2C ecommerce marketing and branding strategies	4.53. B2C and B2B E-commerce Marketing and Branding Strategies: Market Entry Strategies, Establishing the Customer Relationship, Customer Retention Net Pricing Strategies, Channel Strategies 4.54. Case Study on Online Marketing
• Describe social marketing tools techniques and measurement • Demonstrate social marketing tools techniques and measurement • Exemplify location-based marketing tools techniques and measurement	**Unit V: Social, Mobile and Local Marketing (6 Hrs)** 5.36. Social Marketing: Social Marketing Players and Process, Facebook Marketing, Marketing Tools and Measurement, Twitter Marketing, Marketing Tools and Measurement 5.37. Mobile Marketing: Mobile marketing Features and Tools, Basic Mobile Device Features, Measuring Mobile marketing Result 5.38. Local Marketing: Local and Location based marketing and their Growth, Location Based Marketing Platforms, Technologies, and Tools, Measuring Result of Location Based Marketing 5.39. Case Study on Social, Mobile and Local Marketing
• Discuss ethical, social and political issues related with ecommerce • Explain different privacy issues and information rights raised due to ecommerce • Understand intellectual property rights and issues • Discuss issues related to governance of internet and ecommerce • Explain copyright act and cyber law of Nepal	**Unit VI: Ethics Laws and E-Commerce (15 Hrs)** 6.40. Understanding Ethical Social and Political Issues: Model for Organizing the Issues, Ethical Issues, Dilemmas, and Principles 6.41. Privacy and Information Rights: Information's Collected at E-Commerce Sites, Privacy Issues in Social networks. 6.42. Intellectual Property Rights: Types of Intellectual Property Protection: Copyright, Look & Feel, Fair use Doctrine, Patents, Trademarks, Cyber piracy, Meta-tagging, Key-wording, Lining, Framing 6.43. Governance: Governance of Internet and Ecommerce, Public Government and Law, Taxation, Net Neutrality 6.44. Copy Right Acct of Nepal, Cyber Law of Nepal

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%		Viva	25%	

		Attendance	20%	40	Practical Exam	50%	20
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

– Kenneth Loudon, Carol Guárico Traver, E-Commerce Prentice Hall; Seventh edition, 2011.

References

– Electronic Commerce 2010, Efraim Turban, Jae K. Lee, David King, Ting Peng Liang, Deborrah Turban. Pearson Education; Sixth edition
– Andrew B. Whinston and Ravi Kalakota, *"Frontiers of Electronic Commerce"*, Pearson 1996
– P.T. Joseph, *"E-Commerce A Managerial Perspective"*, PHI publication, Fifth edition, 2015

Course Title: Object Oriented Analysis and Design   **Credit: 3**

Course No.CS.Ed.474

Nature of the Course: Theory + Lab   **Total hours: 45+45**

Year: Forth, Semester: Seventh

Level: B. Ed. CSIT

1. Course Introduction

This course starts with object oriented concepts and moves towards the preparation of standard UML diagrams using an UML modeling tool. Besides this the course covers details of object oriented analysis and design process.

2. Objectives

By the end of this course, students will be able

→ To learn the concept of Object Oriented Software Development Process
→ To get acquainted with UML Diagrams
→ To understand Object Oriented Analysis Processes
→ To understand Object Oriented Design Processes

3. Specific Objectives and Contents

Specific Objectives	Contents
• Discuss importance of object orientation • Exemplify objects, classes, inheritance, polymorphism, and aggregation • Explain object attributes, object state, and object identity • Understand object oriented system development process	**Unit I: Overview of Object Oriented System (8 hr Hrs)** 1.36. Orthogonal views of software, Why object orientation, Overview of Unified approach 1.37. Object, Class, Object attribute and state, Object methods and behaviour, Messages 1.38. Encapsulation and Information Hiding, Class Hierarchy, Polymorphism, Object relationships-association, aggregation and composition 1.39. Object Identity, Static and Dynamic Binding, Object Persistence, Meta Classes 1.40. Object Oriented System Development: Object Oriented Analysis, Object Oriented Design, Prototyping, Implementation, Incremental Testing
• Discuss different modeling techniques, methodologies and identify their strengths and drawback • Understand concepts and importance of patterns and framework • Draw different UML diagrams to	**Unit II: Methodologies, Modeling and UML (10 hr)** 2.55. Object Oriented Methodologies: Rumbaugh Modelling Techniques, Booch methodology, Jacobson Methodologies 2.56. Patterns and its Types, Anti-patterns, Pattern Templates, Frameworks 2.57. UML: Static and dynamic models, Introduction of UML, Importance of Modelling 2.58. UML Diagrams: Class Diagram, Object Diagram, Use-case Diagram, Interaction Diagrams, Sate-chart diagrams, activity

model some system	diagram, implementation Diagrams
• Describe object oriented analysis and its difficulties • Understand object oriented analysis process • Perform OOA some real world system to identify actors, use cases, classes, methods and attributes	**Unit III: Object Oriented Analysis (10 hr)** 3.52. Introduction, Analysis Difficulties, OOA Process, Finding actors, Finding Use cases, Naming Use cases, uses and extends association, Case Study for finding use cases and actors 3.53. Object Analysis: Classification theory, Approaches for finding classes: Noun phrase approach, Common class pattern approach, Use case driven approach, CRC approach 3.54. Identifying Relationships: Associations, Super-Sub Class Relationships, Aggregation, Identifying Attributes and Methods, Case Study on Identifying Relationships, Methods and Attributes
• Differentiate OOD from OOA • Understand OOD process, Axioms, and corollaries • Discuss and exemplify object relational mapping • Explain access layer and view layer design process • Perform OOD of some real world system	**Unit IV: Object Oriented Design (12 hr)** 4.55. OOD Process, OOD Axioms and Corollaries, Design patterns, UML Object Constraint Languages, Designing Classes, Define Visibility, Refine Attributes, Designing Methods and Protocols 4.56. Access Layer, Object Relational Databases, Object Relational Mapping, Process for designing access layer classes 4.57. View Layer, Process of designing view layer classes, Macro level process, Micro level process, UI design rules 4.58. Case Study on designing business layer, access layer and view layer classes.
• Discuss and exemplify different types of errors • Explain different test strategies and understand impact of reusability in testing • Exemplify usability testing and test cases.	**Unit V: Software Quality (5 Hrs)** 5.40. Quality Assurance Tests, Testing Strategies, Impact of Object Orientation on Testing, Test Cases, Test Plan, Continuous Testing 5.41. Verification and Validation, Usability Testing, case study on Usability Test Plan and Test Cases

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination		Assignments	20%		Practical Report copy	25%	
(Details are given in the separate table at the end)	40	Quizzes	10%	40	Viva	25%	20
		Attendance	20%		Practical Exam	50%	
		Internal	50%				

		Exams					
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text

– Ali Bahrami, Object Oriented Systems Development using the Unified Modeling Language, McGraw Hill, Reprint 2009.

References

– Grady Booch, James Rumbaugh, Ivar Jacobson, *"The Unified Modeling Language User Guide"*, 2nd Edition, Pearson Education, 2007.
– Bernd Oestereich, Developing Software with UML, Object-Oriented Analysis and Design in Practice, Addison-Wesley, 2000.

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: E-Governance
Course No.CS.Ed.481   **Credit: 3**
Nature of the Course: Theory + Lab   **Total hours: 45+45**
Year: Forth,   **Semester: Eighth**
Level: B. Ed. CSIT
1. Course Introduction
This course is aimed to understanding the concept of e-Governance to better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, efficient government management and resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth and cost reductions. It cover the concept of e-Governance, different model of e-Governances and maturity levels, infrastructure and readiness for e-governance, data ware house and data mining for e-government services, initiatives in Nepal and recent trends of e-Government issues. Student will be analysis the major e-governance case study of Nepal and best case studies of aboard.
2. Objectives
After completion of course, Students will be able to:
   - Understands the basic principle of e-Governance and importance of digital world.
   - Analysed the different model of digital governance and its maturity levels.
   - Define the e-Readiness to successful implementation of e-Governance and analyse current situation of Nepal.
   - Determine the importance of data mining and data warehouse and open data in e-Governance.
   - Analyse the situation of e-Governance in Nepal.
   - Analyse the case study about different e-Government Projects.
3. Specific Objectives and Contents

Specific Objectives	Contents
• Define e-Governance and importance • Explore changing nature of e-Governance services • List out the present global trends of e-Governance • Compare government and governance	**Unit I: Concept of e-Governance(10Hrs.)** 1.41. Definition of e-Governance 1.42. Importance of e-Governance 1.43. Evolution of e-Governance: Its scope and Contents 1.44. Present Global Trends of Growth in e-Governance 1.45. Differentiate Between e-Government and e-Governance

• Analyze the different digital model of e-Governance
• List of level of maturity model and its parameters.
• Justify e-Governance toward
	Unit II: e-Governance Models(15 Hrs.)
	2.59. Model of Digital Governance
	    2.1.1 Broadcasting Dissemination Model
	    2.1.2 Critical Flow Model
	    2.1.3 Comparative Analysis Model

good governance.	2.1.4 Mobilization and Lobbying Model 2.1.5 Interactive-Service Model/ Government-to-Citizen-to-Government (G2CG2G)Model 2.60. Evolution of e-Governance and Maturity Models 2.61. Characteristics of Maturity Model 2.62. Key Focus Area 2.63. Toward good governance through e-Governance Model

• Identify the e-Readiness parameters to success of e-government.
• Analyzed the situation of e-Governance readiness in Nepal
	Unit III: e-Governance Infrastructure, Stage in Evolution and Strategic for Success (15)
	3.55. e-Readiness
	  3.1.1 Data System Infrastructure
	  3.1.2 Legal Infrastructure Preparedness
	  3.1.3 Institutional Infrastructure Preparedness
	  3.1.4 Human Infrastructure Preparedness
	  3.1.5 Technical Infrastructure Preparedness
	3.56. Evolutionary Stage in e-Governance

• Describe the importance of data warehouse and mining in e-Government services. • Explore the area of data ware house and data mining on governance services.	**Unit IV: Application of Data Warehouse and Data Mining in Government (5Hrs.)** 4.59. National Data Warehouses 4.60. Area for Data Warehouse and Data Mining 4.61. Big data in e-Governance
• Understand the open standards and GA of Nepal • Review the status of government data center in Nepal • Describe the e-Government related Act and policies of government of Nepal.	**Unit V: e-Governance of Nepal (10Hrs.)** 5.7. Evolution of e-Governance in Nepal 5.8. Government Enterprises Architecture(GEA) 5.9. E-Government Master plan 5.10. GIDC and Data Centre 5.11. Electronic Traction Act 2063 5.12. Information Communication Technology Policy 2072 5.13. Digital signature
• Understand recent trends in e-Governance • Describe e-Democracy • Describe internet governance • Understands the web standard to e-Governance.	**Unit VI: Recent Trends in e-Governances (15Hrs.)** 6.45. e-Government 2.0: Next Generation Governance 6.46. e-Democracy 2.0 6.47. Open Data: Definition, Principle, uses 6.48. Mobile Governance 6.49. Open Standards for Web Presence 6.50. Government Cloud Services and Open Sources
• Analyze the case study of case study of Nepal • Analyzed selected case study of successful e-Government project. • Create the report of case study	**Unit VII: Case Study (20Hrs.)** 7.15. ICT Development Project ADB in Nepal 7.16. National ID in Nepal 7.17. Government Electronic Procurement System of Nepal (GEPSON) 7.18. IT park Kavre, Banepa 7.19. e-Village/Tele Centre in Nepal

7.20. Smart City in Nepal
7.21. Digital India Project in India

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination	40	Assignments	20%	40	Practical Report copy	25%	20
(Details are given in the separate table at the end)		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Texts

Prabhu, C. S. R. (2012). *E-governance: concepts and case studies*. New Delhi: Prentice-Hall of

India.

Far-western University
Faculty of Education
B.Ed. in Computer Science and Information Technology

Course Title: Compiler Design
Course No. CS.Ed.482   **Credit: 3**
Nature of the Course: Theory + Lab   **Total hours: 45+45**
Year: Fourth, Semester: Eighth
Level: B. Ed. CSIT

1. Course Introduction
This course is designed to develop acquaintance with fundamental concepts of compiler design. The course starts with the basic concepts and also includes different phases of compilers like lexical analysis, syntax analysis, syntax-directed translation, type checking etc. in detail.

2. Objectives
On completion of this course, students will be able to
- develop their knowledge in compiler design
- develop lexical analyzers, parsers, and small compilers using different tools
- develop lexical analyzers, parsers, and small compilers by using general purpose programming languages.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Identify phases of compiler design • Perform analysis of simple program statements • Demonstrate the concepts of symbol-table manager and error handler • Recognize different tools used in compiler design	**Unit One: Introduction [3 Hr.]** 1.7. Compilers, Analysis of the Source Program, Phases of a Compiler 1.8. Cousins of the Compiler, Compiler Construction Tools
• Exemplify lexical analysis and , input buffering and tokens • Understand role of regular expressions and Finite Automata in specification of tokens • Trace the algorithms used in implementing and optimizing pattern matchers	**Unit Two: Lexical Analysis [8 Hr.]** 3.6. The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens 3.7. Finite Automata, From Regular Expression to an NFA, Optimization of DFA-Based Pattern Matches
• Understand and write context free grammars • Demonstrate different top down and bottom-up parsing techniques • Parse the statements using different	**Unit Three: Syntax Analysis [12 Hr.]** 4.8 The Role of Parser, Context Free Grammars, Writing a Grammar 4.9 Top-Down Parsing, Bottom-Up Parsing 4.10 Operator-Preceding Parsing, LR Parsers, Using

variants of LR parsers • Handle ambiguity in context free grammars	Ambiguous Grammars
• Understand generalization of context free grammars • Construct syntax tree from syntax directed definitions • Exemplify bottom up evaluation of s-attributed definitions and l-attributed definitions • Demonstrate top-down translation and bottom-up evaluations of inherited attributes	**Unit Four: Syntax-Directed Translation [6 Hr.]** 5.6. Syntax-Directed Definition, Construction of Syntax Trees 5.7. Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions 5.8. Top-Down Translation, Bottom-Up Evaluations of Inherited Attributes
• Understand the rules for assigning type expressions • Specify a type checker for a simple language • Exemplify type conversions and attribute grammar for type checking system	**Unit Five: Type Checking [3 hr.]** 6.9. Type Systems, Specification of a Simple Type Checker 6.10. Type conversions, Attribute Grammar for a Simple Type Checking System
• Understand idea behind intermediate languages • Understand declarations, assignment statements, Boolean expressions, and case statements • Demonstrate the concepts of backpatching and procedure call	**Unit Six: Intermediate Code Generation [4 Hr.]** 7.2. Intermediate Languages, Declarations, Assignments Statements 7.3. Boolean Expressions, Case Statements, Backpatching 7.4. Procedure Calls
• Recognize issues in the design of code generator • Understand target machine, its instruction set, and runtime storage management • Demonstrate basic blocks and flow graphs • Exemplify simple code generator, register allocation and assignment • Understand dag representation of basic blocks and code generation from dag	**Unit Seven: Code Generator [5 Hr.]** 8.7. Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management 8.8. Basic Blocks and Flow Graphs, Next Use Information, A Simple Code Generator, Register Allocation and Assignment 8.9. The Dag Representation of Basic Blocks, Generating Code from Dags
• Understand some of the most useful code-improving transformations • Demonstrate Peephole optimization optimize basic blocks • Exemplify loop optimization	**Unit Eight: Introduction to Code Optimization [4 Hr.]** 9.6. Introduction, The Principal Sources of Optimization 9.7. Peephole Optimization, Optimization of Basic Blocks, Loops in Flow Graphs

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weight age**	**Marks**	**Practical**	**Weight age**	**Mark**
End semester examination (Details are given in the separate table at the end)	40	Assignments	20%	40	Practical Report copy	25%	20
		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	40	Total Internal	100%	40		100%	20
Full Marks 40+40+20 = 100							

Prescribed Text
- Compilers Principles, Techniques, and Tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman; Pearson Education

References
- Compiler Design, Sandeep Saxena, Rajkumar Singh Rathore, S.Chand
- Introduction to Automata Theory, Languages, and Computation, Johne E. Hopcroft, Rajeev Motwani, Jeffrey D. Ulman, Pearson Education

Course Title: Project Work **Credit: 3**
Course No: CS.Ed.483
Nature of the Course: Project
Year: Forth, **Semester: Eighth**
Level: B.Ed. CSIT

1. Course Introduction

This course will allow students who are taking the any course to expand their programming knowledge and work on significant projects of their choice. Lessons on software development processes, project design & management, and other topics will assist in completing the projects as well as advance their programming skills. There is no set syllabus. Students identify their chosen project area and are allocated a supervisor who is a member of the academic staff, and is responsible for providing support and guidance. Students are responsible for organizing themselves and their work, with advice from their supervisor with whom they should meet on a regular basis, as agreed with the supervisor.

2. Objectives

Upon completion of this course students will be:

→ Experienced and empowered in undertaking significant project work in a self disciplined, organized, and professional manner from conception to documentation.
→ Skilled in analyzing, designing and developing of meaningful and efficient real world application

3. Method of Instruction:

Individual or group working with support from the project supervisor

4. Tentative Project Report Format

The final report documents the results of the project and should be submitted within 15 days after finishing final examination. Students should use Times New Roman Font and Line spacing 1.5 while formatting their project report. Tentative project report format should be as per following outline:

Front Part

– Cover Page
– Students Declaration
– Supervisors Recommendation
– Letter of Approval
– Acknowledgement
– Abstract
– Table of Contents

Body Part

a. Introduction and Background

First and foremost, you should write about the most interesting or important parts of your project. Devote most space and time to this. For example:

- What design choices did you have along the way, and why did you make the choices you made?
- What was the most difficult part of the project?
- Why was it difficult?
- How did you overcome the difficulties?
- Did you discover anything novel?
- What did you learn?

Set the scene and problem statement/specification. Provide the motivation for reading this report. Introduce the structure of report (what you will cover in which chapters).

You should provide enough background to the reader for them to understand what the project is all about. For example:

- What the reader needs to know in order to understand the rest of the report. Examiners like to know that you have done some background research and that you know what else has been done in the field (where relevant). Try to include some references.
- Related work (if you know of any)
- How does this relate to other work in this area?

b. Analysis and Design

- Write how requirements are collected and also write about feasibility analysis of the project.
- If your project involves designing a system, give a good high-level overview of your design. In many projects, the initial design and the final design differ somewhat.
- If the differences are interesting, write about them, and why the changes were made. If your design was not implemented fully, describe which parts you did implement, and which you didn't. If the reason you didn't implement everything is interesting write about it.

c. Implementation and Testing

- Give description of tools used in implementation and code details (not a complete listing, but descriptions of key parts). Discuss the most important/interesting aspects.
- Test plan -- how the program/system was verified. Put the actual test results in the Appendix.

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    d. Conclusion, Evaluation and Further Work

        What have you achieved? Give a critical appraisal (evaluation) of your own work - how could the work be taken further (perhaps by another student next year)?

End Part

– References
– Bibliography
– Appendices

Note-Referencing and Citation should follow IEEE style.

5. Evaluation System

Internal Evaluation:-40%

– Proposal Defence:-10%
  Needs to be evaluated in following basis
    – Concept and Depth of Understanding
    – Proposal document
    – Presentation
    – Viva
– Mid Term Evaluation:-30%
  Students are expected to complete their database design and also start design and implementation of the project. Evaluation should be done following basis
    – Database Design
    – Progress and clarity of concepts
    – Presentation
    – Viva

External Evaluation: -60% (Supervisor:-30%, External Examiner:-30%)

External evaluation should be done in the presence of external examiner and evaluation should be done following basis

– Project Report
– Practical relevance of the project
– Presentation
– Viva