Course Title: Computer Architecture`
Course no: CSC-201   Full Marks: 90+10
Credit hours: 3   Pass Marks: 36+4

Nature of course: Theory (3 Hrs.)

Course Synopsis: This course gives the fundamental knowledge concern with the
                          way the hardware components are connected together to form a
                          computer system and how they interact to provide the processing
                          needs of the user.

Goals:

- Introduces the fundamental concepts behind the design working and organization
  of a computer system.
- Instruction set architecture, memory hierarchies and interconnection.

Course Contents:

Unit 1. Data Representation   **5 Hrs.**

Complements, Fixed point representation, Floating-Point Representation, Gray Code,
Error Detection Codes

Unit 2. Microoperations   **5 Hrs.**

Arithmetic Microoperations, Logic Microoperations, Shift Microoperations,
Arithmetic Logic Shift Unit

Unit 3. Fundamental of Computer Organization and Design   **7 Hrs.**

Computer Register, Computer Instructions, Instruction Cycle, Input and Output and
Interrupt, Basic computer Design and Accumulator Logic

Unit 4. Control Unit   **5 Hrs.**

Control Memory, Hardwired control, Microprogrammed Control

Unit 5. Central Processing Unit   **6 Hrs.**

Register Organization, Register Stack an memory Stack, One address and two address
instruction, Addressing Modes, Data transfer and Manipulation, Introduction to RISC
and CISC

Unit 6. Fixed point Computer Arithmetic   **5 Hrs.**

Addition and Subtraction, Multiplication, Division Algorithm,

Unit 7. Input and Output Organization   **6 Hrs.**

Introduction to Peripheral Devices, I/O interface, Direct Memory Access (DMA), I/O Processor, Data communication processor

Unit 8. Memory Organization   **6 Hrs.**

Hierarchy of Memory System, Primary and Secondary Memory, Virtual Memory, Memory Management hardware

Text Books: M. Morris Mano, **Computer System Architecture**

References:

M. Morris Mano "Digital Design", Pearson Education, Third Edition

M. Morris Mano "Logic and Computer Design Fundamentals, Pearson Education, 2nd Edition Updated.

Course Title: Object Oriented Programming
Course no: CSC-202   Full Marks: 70+10+20
Credit hours: 3   Pass Marks: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Study of basic programming skills, the concept of object oriented
                         and its features, implementing the features.

Goal: To provide the object oriented programming approach to solve the problem.

Course Contents:

Unit 1:   **11 Hrs.**

   1.1   Introduction to Programming Concept: Overview of structural programming
         approach, Object oriented approach, Features of object oriented languages,
         Components of object oriented languages like object, class.

   1.2   Elements of Object Oriented Languages: Introduction to inheritance,
         polymorphism, abstraction.

   1.3   C++ basics: Introduction, Basic Program Construction like functions and
         program statements. Output using cout, Directives: Preprocessor Directives,
         Header Files, The using directives. Comments: Comment Syntax. Integer
         Variables: Definition, declaration, variables names, assignment statements,
         integers constants, output variable. Input with cin, Operators, library functions.

Unit 2:   **15 Hrs.**

   2.1   Control Structures: Introduction, control statements, The **if** selection structure,
         The **if/else** selection structure, The while structure, The **For** structure, The
         switch structure, The **do/while** structure, The **break** and **continue** statement.

   2.2   The Functions: Introduction, Math library functions, Definition/Prototypes,
         Header files, Storage classes, Scope rules, Recursion, Inline functions, Function
         Overloading, Function Templates.

   2.3   Arrays: Introduction, Declaring arrays, Passing arrays to functions, Types of
         arrays.

   2.4   Pointers: Introduction, Pointer variables declaration & initialization, Operators
         in pointers, Calling functions by reference, Relationship between pointers &
         arrays, arrays of pointers, Function pointers.

Unit 3:   **19 Hrs.**

3.1 Classes & Objects: Introduction, Features of class, Object and its features, Declaration of class, Using the class, Accessing members of class, Class scope, Initialization class objects: Constructor, Destructor. Object as function arguments: Overload constructor, Member functions defined outside the class, Objects as arguments.

3.2 Operator Overloading: Introduction, Fundamental of operator overloading, Restriction on operator overloading, Operator functions as a class members, Overloading stream-insertion and stream-extraction operators, Overloading unary and binary operators.

3.3 Inheritance: Introduction, Types of inheritance, Protected members, Casting base class pointers to derived – class pointers, Public, protected, and private inheritance. Constructor and Destructor in derived classes.

3.4 Virtual Functions & Polymorphisms: Introduction, Type fields & switch statements, Virtual functions, Abstract base classes & Concrete classes, Polymorphism and its roles.

3.5 Templates: Introduction, Function templates, overloading templates functions, class templates, templates & inheritance.

3.6 Exceptional Handling: Introduction, Use of exceptional handling, **Try, throw** and **catch.**

Laboratory works:

1. Write a C++ code to solve the quadratic equations.
2. Write a C++ code to find out the prime number between 2000 and 2050.
3. Write a C++ code to sort the given 10 numbers in ascending order.
4. Write a C++ code to create a class that calculates the interest of any number.
5. Write a C++ code to get the transpose of given matrix.
6. Write a C++ code that uses the polymorphism.
7. Write a C++ code that uses the inheritance.
8. Write a C++ code that uses exceptional handling facility.
9. Write a C++ code to reverse the given text.
10. Write a C++ code to get the list of leap year from 1900 to 2000.

Text Books: C++ How to Program; Deitel & Deitel, 3rd Edition, PEARSON

Reference: Object Oriented Programming in C++; Robert Lafore, Third Edition, GALGOTIA

Homework Assignment: Assignment should be given from the above units in throughout the semester.

Computer Usage: No specific
Prerequisite: C
Category Content: Science Aspect: 40%
Design Aspect: 60%

Course Title: Operating Systems
Course no: CSC-203   Full Marks: 70+10+20
Credit hours: 3   Pass Marks: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Fundamental concepts of uniprocessor operating systems. Evolution process management, Memory management, File systems, I/O processing.

Goal: This course introduces fundamental concepts of contemporary uniprocessor operating systems.

Course contents:

Unit 1:   **6 Hrs.**

   1.1.   Historical background: Operating system evolution, hardware review, operating system structure. Overview of operating system: batch system, multiprogramming, time-sharing, real-time, mainframe operating systems, personal computer operating systems, system calls.

Unit 2:   **14 Hrs.**

   2.1. Process management: Process creation, process termination, process states, attributes; thread creation, termination, process scheduling.
   2.2. Interprocess communication and synchronization: race conditions, critical regions, mutual exclusion, busy waiting, sleep and wakeup, semaphores, monitors, message passing, classical IPC problems and deadlock.

Unit 3:   **13 Hrs.**

   3.1. Memory management: Absolute and relocable partition, multiprogramming, swapping,   overlays, virtual memory, paging, page replacements algorithms, segmentation, segmentation with paging.
   3.2. File systems: file system interface, file system implementation.

Unit 4:   **12 Hrs.**

   4.1. Device management: I/O hardware and software, software layers.

   4.2. Disk management: Disk structure, Disk scheduling, error handling and formatting, RAID, stable storage management.
   4.3. Case studies (Linux and Window 2000)

Laboratory works: Small programming assignments of process creation, termination, deletion, thread creation, terminations, signals handling, process

synchronization, process communication, classical IPC problems, file system and I/O handling.

Textbooks: Andrew S. **Tanenbaum, Modern Operating Systems**, 2nd Edition, Prentice-Hall.

References: Silberschatz, Galvin and Gagne, **Operating System Concepts**, 6th Edition, Addition Wesley.

Homework
Assignments: Homework assignments covering lecture materials will be given throughout the semester.
Computer Usage: Unix or Linux base PC or workstation.
Prerequisites: C, Data structures and Computer Organization.
Category Content: Science Aspect: 70%
         Design Aspect: 30%

Course Title: Numerical Method
Course no: CSC-204   Full Marks: 70+10+20
Credit hours: 3   Pass Marks: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course contains the concept of numerical techniques of solving the differential equations and algebraic equations.

Goal: To be familiar with the theory of numerical analysis for solving algebraic equations, solution of ordinary and partial differential equations related to engineering problems

Course Contents:

Unit 1. Solution of Nonlinear Equations: **10 Hrs.**

Review of calculus and Taylor's theorem, Errors in numerical calculations, Trial and error method, Half- interval method, and convergence, Newton's method, secant method and their convergence, Fixed point iteration and its convergence, Newton's method for polynomials and Horner's method

Unit 2. Interpolation and Approximation: **8 Hrs.**

Lagrang's polynomials, Newton's interpolation using difference and divided differences, Cubic spline interpolation, Least squares method for linear and nonlinear data

Unit 3. Numerical Differentiation and Integration: **5 Hrs.**

Newton's differentiation formulas, Maxima and minima of tabulated function, Newton-Cote's quadrature formulas, Trapeziodal rule, Simpson's rule, 2D algorithm, Gaussian integration algorithm, Romberg integration formulas

Unit 4. Solution of Linear Algebraic Equations: **10 Hrs.**

Review of the existence of solutions and properties of matrices, Gaussian elimination method , pivoting, ill-conditioning, Gauss-Jordan method, Inverse of matrix using Gauss elimination method, Method of factorization, Dolittle algorithm, Cholesky's factorization, Iterative solutions, Eigen values and eigen vectors problems, Solving eigen value problems using power method.

Unit 5. Solution of Ordinary Differential Equations: **7 Hrs.**

Review of differential equations, Initial value problem, Taylor series method, Picard's method, Euler's method and its accuracy, Heun's method, Runge-Kutta methods, Solution of the higher order equations, Boundary value problems: Shooting method and its algorithm

Unit 6. Solution of Partial Differential Equations: **5 Hrs.**

Review of partial differential equations, Deriving difference equations, Laplacian equation and Poisson's equation, engineering examples

Laboratory works: The laboratory experiments will consist of program development and testing of non-linear equations, interpolation, numerical integration and differentation, linear algebraic equations, ordinary and partial differential equations.

Text / Reference books:

1. W. Chency and D. Kincaid, "*Numerical Mathematics and Computing*", 2nd Edition, Brooks/Cole Publishing Co., 1985
2. C.F. Gerald and P.O. Wheatley, "*Applied Numerical Analysis*", 4th Edition, Addison Wesley Publishing Company, New York.
3. W.H. Press, B.P. Flannery et.al., "*Numerical Recipes in C*", 1st Edition, Cambridge Press, 1988.
4. S. Yakwitz and F. Szidarovszky, "*An Introduction to Numerical Computations*", 2nd Edition, Macmillan Publishing Co., New York.

Course Title: Introduction to Management
Course no: CSC-205   Full Marks: 90+10
Credit hours: 3   Pass Marks: 36+4

Nature of course: Theory (3 Hrs.)

Course Synopsis: Evolution of management and management theories related with planning, organizing, and controlling business activity.

Goal: This course presents a systematic coverage of management theory and practice. Therefore it focuses on the basic roles, skills and functions of management, with special attention to managerial responsibility for effective and efficient achievement of goals.

Unit 1. Introduction   **3 Hrs.**

Definition of management, Characteristics of management, Principles of management, Functions of management

Unit 2. Evolution of Management Theory   **6 Hrs.**

Scientific management theory, Administrative management theory, Behavior science theories, the management science theory, the system approach, the contingency approach

Unit 3. The Environment of Management   **6 Hrs.**

Concept of business environment, Internal and external environment, Components of political, economic, socio-cultural and technological environment, Social responsibility, Management ethics

Unit 4. Planning and Decision Making   **8 Hrs.**

Definition and importance of planning, Types of planning – Corporate, tactical and operational plans; Single use and standing plans; Specific and flexible plans, Hierarchy of planning, Methods, steps and process of planning, MBO, Meaning of decision-making, Types of decision making – Programmed and non-programmed; Strategic, tactical and operational and Individual and group decision-making

Unit 5. Organization and Human Resource Management   **6 Hrs.**

Definition and characteristics of organization, Types of organization – Line, Line and staff, functional and matrix type of organization, Centralization Vs. decentralization, Meaning of HRM, Components of HRM – Acquisition, development, utilization and maintenance

Unit 6. Motivation, Leadership and Conflict **8 Hrs.**

Meaning of motivation, Motivation theories - Hierarchy of needs theory; Motivation –hygiene theory; and Theory X - Theory Y, Meaning of leadership, Leadership styles – Autocratic, democratic and free rein and Managerial grid theory, Meaning and sources of conflict, Conflict resolution – Avoidance, defusion, containment and confrontation

Unit 7. Communication and Controlling **8 Hrs.**

Meaning and process of communication, Types of communication – Formal and informal communication and Interpersonal and non-verbal communication, Barriers to effective communication, Techniques for improving communication, Meaning of controlling, Types of control system - Pre-control; concurrent control and post-control, Characteristics of effective control system, Introduction to MIS

Textbooks:	**Agrawal, Govind Ram,** Principles of Management**,** M. K. Publishers & Distributors, Kathmandu. Kreitner, Robert, Management, 1999
References:	Robbins, Stephen P., and Coulter, Mary, **Management**, Prentice-Hall of India, New Delhi, 2002 Griffin, Ricky, **Management**, Houghton-Miffin, USA, 1998

Homework
Assignments: Home works shall be given to the students with emphasis on small cases.