MTH 122.3 Mathematical Foundation of Computer Science (3-2-1)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	80	-	100

Course Objectives:

1. The main objective of this course is to buildup the mathematical foundation for the study of computational science and computer technology.
2. This course introduces the student to discrete mathematics and finite state automata through an algorithmic approach and focuses on various problems solving technique.
3. It helps the target student in gaining fundamental and conceptual clarity in the area of Logic Reasoning. Algorithms, Recurrence relation. Graph Theory, and Theory of Automata.

Course Contents:

1. Graph Theory (15 hrs)

Definitions, Directed and Undirected Graphs. Walk, Path, Circuits, Connected Components. Connected Component Algorithm, Shortest –Path Algorithm.

Computer representation a graph (Static Representation only, like Adjacency Matrix, Incidence Matrix, Path Matrix): Bi-partite graphs. Regular graphs, Planar graphs. Euler graph. Hamilton graph and their properties and characterization.

Application of graph theory in computer science (with example).

2. Logic and Induction (8 hrs)

Propositions and Truth functions, Predicates and Quantification, Propositional and Predicate Logic, Expressing statement in the language of Logic. Deduction in Predicate Logic, Elementary Step-wise Induction and Complete Induction.

3. Introduction to Mathematical Reasoning (7 hrs)

Formal Languages and Inductive Definitions: Axioms, Rules of Inference and Proofs, Direct Proof and Indirect Proof. Formal Proof and Informal Proof.

4. Recurrence Relations (7 hrs)

Recursive Definition of Sequences. Differencing and Summation, Solution of Linear Recursive Relation, Solution of Non-linear Recurrence Relation.

5. Finite State Automata (8 hrs)

Alphabets and Language, Notion of a State. State Machine (FSM and DFA). Regular Expression, Equivalence Relation.

Reference Books:

1. Richard Johnsonbaugh, Discrete Mathematics, Fifth Edition, Addison Wesley, Pearson Education Asia (LPE), ISBN: 81-780-82799, 2000
2. Mott, Joe L., Kandel Abraham and Baker, Theodoe P., Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, Prentice-Hall, ISBN: 81-203-1502-2
3. Liu, C.L., Elements of Discrete Mathematics, TMH, 2000, ISBN: 0-07-043476-X
4. Trus, J., Discrete Mathematics for Computer Scientists, Second Edition, Addision Wesley ISBN: 0-201-36061,1999

ELX 212.3 Logic Circuits (3-1-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:

1. To provide basic of logic systems.
2. To design a basic digital computer.
3. .....

Course Contents:

1. Introduction (3 hrs)

Numerical representation, Digital number system, Digital and analog system, ...

2. Number System and Codes (6 hrs)

Binary to decimal and decimal to binary conversions, Octal, hexadecimal number system and conversions, Binary Arithmetic 1's complement and 9's complements, gray code, Instruction codes, Alphanumeric characters, Modulo2 system and 2's complement, Binary Coded Decimal (BCD) and hexadecimal codes, Parity method for error detection.

3. Boolean Algebra and Logic Gates (4 hrs)

Basic definition, Basic properties and theorem of Boolean algebra, DeMorgan's Theorem, Logic gates and truth tables, Universality of NAND and NOR gates. Tristate logic.

4. Simplification of Boolean Function (5 hrs)

Venn diagram and test vectors, Karnaugh maps up to five variables, Minimum realization, don't care conditions, Logic gates implementation, practical design steps.

5. Combination Logic (4 hrs)

Design procedure, Adders and subtractors, Code conversion, Analysis procedure. Multilevel NAND and NOR circuits, Parity generation and checking.

6. MSI and LSI Components in Combinational Logic Design (5 hrs)

Binary adder and subtractor, Decimal adder, Magnitude comparator, Decoder and encoder, Multiplexer and demultiplexer, Read-only memory (ROM), Programmable Logic Array (PLA).

7. Sequential Logic (6 hrs)

Event driven model and state diagram, flip-flops and their types. Analysis of clocked sequential circuits, Decoder as memory devices, State reduction and assignment, Synchronous and asynchronous logic, Edge triggered device. Master slave flip-flops, JK and T flip-flops.

8. Registers, Counters and Memory Unit (6 hrs)

Registers, shift registers, Superposition of registers, generation of codes using registers, Ripple, Synchronous and Johnson Counters, Design of multiple input circuits, Random Access Memory (RAM). Memory decoding, error-correction code, Output hazards races.

9. Arithmetic Logic Units (5 hrs)

Nibble adder, Adder/ substrata unit, Design of arithmetic logic unit. Status register, Design of shifter, Processor unit, Design of accumulator.

Laboratory Work:

1. Familiarization with logic gates.
2. Encodes and decodes
3. Multiplexer and demultiplexer
4. Design of simple combination circuits.
5. Design of adder/subtractor
6. Design of flip-flop
7. Design of counter
8. Clock driven sequential circuits
9. Conversion of parallel data into serial format.
10. Generation of timing signal for sequential system.

Reference Books:

1. M. Mano, Digital Logic and Computer Design, Prentice Hall of India 1998.
2. M. Mano, Computer System Architecture, Prentice Hall of India, 1998.
3. M. Mano, Digital Design, Prentice Hall of India, 1998.

New

Course Code: *CMP 483.3*
Course Name: **Web Technology (3-0-3)**

Evaluation

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:
To be familiar with the basic techniques of Web Technology and Web Programming. The students will be familiar with the recent technologies such as web technology, client site programming, server side programming, and will be able to develop web based applications using most recent technologies.

1. **Fundamentals** **(6 hrs)**

   Introduction to Internet, WWW, Web Browsers, Web Servers, URL, Multipurpose Internet Mail Extensions, Overview of different protocols: HTTP, POP, SMTP, FTP, WAP, Web Architecture, Web Standards, Domain name and hierarchy, domain name registration process, web hosting

2. **Introduction to HTML and XHTML** **(6 hrs)**

   Origins and evaluation of HTML, Basic Syntax, Standard HTML Document Structure, Basic Text Formatting, Images, Hypertext Links, Lists, Tables, Frames, Forms, Multimedia in HTML

3. **Cascading Style Sheets** **(5 hrs)**

   Introduction, Levels of Style Sheets, Style Specification Formats, Style classes, Properties and Property values, color, the and tags

4. **Introduction to Java Script** **(11 hrs)**

   Basics of Java script, Document Object Model, Element Access in Java scripts, event and event handling, DOM Event Model, Element Positioning, Moving elements, Element visibility, changing colors and fonts, dynamic content, stacking elements, Locating the mouse cursor, reacting to a mouse click, dragging and dropping elements

5. **Programming in PHP and MYSQL** **(17 hrs)**

   Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Basic Pattern Matching, Form Handling, Files Handling, Cookies, Session Tracking, Database Access with PHP and MySQL

Laboratory:

1. Every topic of the course content should be included for the lab.
2. Individual or group project work to develop a web application could be assigned. This should cover most of the technologies included in the course content

Text Book:

1. Robert W. Sebesta, Programming the World Wide Web, Addison-Wesley ,4/E ISBN-10: 0321489691

Reference Books:

1. W3Schools Online Web Tutorials, www.w3school.com
2. Ipfaffenberger, World Wide Web Bible, BPB, ISBN: 81-7029-781-8
3. Powell, The Complete Reference to HTML and XHTML, TATA McGRAW HILL, Fourth Edition

6. MTH 121.3 Engineering Mathematics II (3 – 2 – 0)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objective:

The main objective of this course is to provide the basic knowledge of three dimensional geometry, Calculus of several variables, differential equation, Laplace transform. After the completion of this course, students can use their knowledge in their professional course.

Chapter	Content	Hrs
1	**Three Dimensional geometry :** i. Review of direction cosines, direction ratios, Planes ii. Straight lines iii. Sphere and its tangent plane iv. Cone and cylinder(definitions, standard equation only)	12
2	**Partial derivatives and Extreme values for function of two or more variables:** i. Definitions, total derivatives, Chain rule, Eulers theorem for function of two or three variables, its application ii. Extreme values for two or more variables	6
3	**Laplace transformation:** i. Definition ii. Derivation of formulae iii. Application of laplace transform, iv. Inverse laplace transform v. Convolution theorem on laplace transform and application	8
4	**Differential equation:** i. Order and degree of differential equation ii. First order differential equation with their solutions (separable, reducible to separable form exact ness condition), linear and Bernoulies equation) iii. Second order differential equation (Homogeneous and non homogeneous) with constant coefficient as well as variable coefficients. iv. Initial value problem. v. Power Series solution vi. Legendres and Bessel equation with their solution, properties and application	13
5.	**Double Integral:** i. Definitions, Fubinis theorems (statement only) ii. Change of order, iii. Change Cartesian integral to equivalent polar integral iv. Area and volume by double integral	6

Text Books:

1. Engineering Mathematics II: Prof. D.D Sharma (Regmi), Toya Narayan Paudel, Hari Prasad Adhikari, Sukunda publication, Bhotahity, Kathmandu.
2. Advance Engineering Mathematics : Erwin Kreyszig.

Reference Books:

1. Calculus with analytical geometry: E.W. Swokoswski.
2. Algebra: G.D Pant
3. Three Dimensional Geometry: Y.R Sthapit, B.C Bajracharya
4. Calculus and analytical geometry: George B Thomas, Ross L. Finney

7. MEC 109.2 Engineering Drawing (0-0-6)

Evaluation:

	Theory	Practical	Total
Sessional	-	50	50
Final	-	50	50
Total	-	100	100

Course Objectives:

1. To develop sketching, lettering and drafting skills
2. To draw projections, drawings of various geometric figures.
3. To draw assembly of machine parts.
4. To develop ability of preparing working drawings

Course Contents:

1. **Instrumental Drawing, Practices and Techniques** **(12 hrs)**

Equipment and metals, Description of drawing instruments, auxiliary equipment and drawing materials, Techniques of instrument drawing, pencil sharpening, securing paper, proper use of T-squares, triangles, scales, dividers, compasses, erasing shields, French curves, inking pens.

Freehand Technical Lettering

Lettering strokes, letter proportions, use of pencils and pens, uniformity and appearance of letters, freehand techniques, inclined and vertical letters and numerals, upper and lower cases, standard English lettering forms.

Dimensioning

Fundamentals and Techniques: size and location dimensioning, IS conversion; Use of scales, measurement units, reducing and enlarging drawings; General dimensioning practices: placement of dimensions aligned and unidirectional recommended practice, some 50 items.

2. **Applied Geometry** **(24 hrs)**

Plane geometrical construction: Bisecting and trisecting lines and angles, proportional division of lines, construction of angles, triangles, squares, polygons, constructions using tangents and circular archs. Methods of drawing standard curves such as ellipse, parabolas, hyperbolas, involutes, spirals, cycloid and helices (cylindrical and helical); Solid geometrical construction: Classification and pictorial representation of solid regular objects such as: prisms, square, cubical, triangular and oblique, Cylinders: right and oblique, Cones: right and oblique, Pyramids: square, triangular, oblique, truncated; Doubly-curved and warped surfaces: Sphere, torus, oblate ellipsoid, conoid, serpentine, paraboloid, hyperboloid

Basic Descriptive Geometry

Introduction: Application of descriptive geometry principles to the solution of problems involving positioning of objects in three-dimensional space; The projection of points, and planes in space; Parallel lines; True length of lines: horizontal, inclined and oblique lines; Perpendicular lines; Bearing of a line; Point view of end view of a line; Shortest distance from a point to a line; Principal lines of a plane; Edge view of a plane; True shape of an oblique plane;

Intersection of a line and plane; Angle between a line and a plane; Angle between two non-intersecting (skew) lines; Dihedral angle between two planes; Shortest distance between two skew lines.

3. **Theory of Projection Drawing** **(24hrs)**

Perspective projection drawing; Orthographic projection; Axonometric projection; Oblique projection; First and third angle projection;

Multi-view Drawings

Principal views: Methods for obtaining orthographic views: Projection of lines, angles and plane surfaces, analysis in three views; Projection of curved lines and surfaces; Object orientation and selection of views for best representation; Full and hidden lines. Orthographic drawings: Making an orthographic drawing, Visualizing objects from the given views; Interpolation of adjacent areas; True-length lines; Representation of holes; conventional practices.

Sectional views

Full section view; Half section; Broken section; Revolved section; Removed (detail) sections; Phantom of hidden section; Auxiliary sectional views; Specifying cutting planes for sections; conventions for hidden lines, holes, ribs, spokes.

Auxiliary Views

Basic concept and use of auxiliary views; Drawing methods and types of auxiliary views; Symmetrical and unilateral auxiliary views; Projection of curved lines and boundaries; Line of intersection between two planes; True size of dihedral angles; True size and shape of plane surfaces.

4. **Development and Intersections** **(15hrs)**

Development: General concepts and practical considerations, Development of a right or oblique prism, cylinder, pyramid and cone; Development of truncated pyramid and cone; Triangulation method for approximately developed surfaces; Transition pieces for connecting different shapes; Development of a sphere; Intersections: Lines of intersection of geometric surfaces; Piercing point of a line and a geometric solid; intersection lines of two planes; Intersection of prisms and pyramids; Intersection of a cylinder and an oblique plane; Intersection of a sphere and an oblique plane; Constructing a development using auxiliary views; Intersection of two cylinders; Intersection of a cylinder and cone.

5. **Machine Drawing** **(15hrs)**

Introduction: production of complete design and assembly drawings; Fundamental techniques: size and location dimensioning; placement of dimension lines and general procedures; standard dimensioning practice (IS system); Limit dimensioning: nominal and basic size, allowance, tolerance, limits of size, clearance fit, interference fit; basic hole system and shaft systems; Thread and standard machine assembly elements: screw threads: ISO standards, representation and dimensioning; Fasteners: type and drawing representation, keys, collars, joints, springs bearings; Assembly drawings: drawing layout, bill of materials, drawing layout, bill of materials, drawing numbers.

Laboratory Work:

Freehand technical lettering and use of drawing instruments; Dimensioning; Geometrical and Projection drawing; Descriptive geometry; Projection and multiview drawings; Sectional views; Auxiliary views, Freehand sketching and visualization; Development and intersections; machine and assembly drawings.

Reference Books:

8. Luzadder, *Fundamentals of Engineering Drawing*, Prentice Hall of India Ltd., 8th edition, 1981.
9. French, C.J. Vierck and R.J. Foster, *Engineering Drawing and Graphic Technology*, McGraw-Hill, 1981.
10. Machine drawing P.S. Gill, S.K. Kataria and Sons, India, 7th Edition, 2008.

10. CMP 104.3 Object Oriented Programming in C++ (3-1-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:

- To familiarize with Object Oriented Concept.
- To introduce the fundamentals of C++
- To enable the students to solve the problems in Object Oriented technique
- To cope with features of Object Oriented Programming

Course Contents:

Chapter	Content	Hrs.
1	**Thinking Object Oriented** Object oriented programming a new paradigm, a way of viewing world agent, types of classes, computation as simulation, coping with complexity, nonlinear behavior of complexity, abstraction mechanism	4
2	**Classes and Methods:** Review of structures, classes and inheritance, state, behavior, method, responsibility, encapsulation, data hiding, Functions: friend function, inline function, static function, reference variable, default argument	7
3	**Message, Instance and Initialization** Message, message passing formalization, message passing syntax in C++, mechanism for creation and initialization (constructor and its types), Issues in creation and initialization: memory map, memory allocation methods and memory recovery	6
4	**Object Inheritance and Reusability** Introduction to inheritance, Subclass, Subtype, Principle of Substitutability; Forms of polymorphism and their implementation in C++,inheritance merits and demerits, composition and its implementation in c++, The *is-a* rule and *has-a* rule, Composition and Inheritance contrasted, Software reusability	9
5	**Polymorphism** Polymorphism in programming language, Varieties of polymorphism, compile time polymorphism, function overloading, operator overloading, type conversion, polymorphic variable, run time polymorphism, object pointer, this pointer, virtual function, overriding, deferred method, pure polymorphism.	8
6	**Template and generic programming** Generic and template functions and classes, cases study: container class and the	4

standard template library, Exception handling

7

7 **Object oriented Design**

Reusability implies non- interference, Programming in small and programming in large, components and behaviors, role of behaviors in OOP, CRC, sequence diagram, Software components, formalizing the interface, interface and implementation, Design and representation of components, coming up with names, implementation components, integration of components

Laboratory Work

There shall be 20 exercises in minimum, as decided by the faculty. The exercises shall encompass a broad spectrum of real-life and scientific problems, development of small program to the development of fairly complex subroutines, programs for engineering applications and problem solving situations. Laboratory assignments will be offered in groups of two to four for evaluation purpose. In general, the Laboratory Work must cover assignments and exercises from the following areas:

1. Data types – control structures, functions and scoping rules.
2. Composite data types, C++ strings, use of " Constant " keyword, pointers and references
3. Classes and data abstraction
4. Inheritance, abstract classes and multiple inheritance
5. Friend functions, friend classes and operator overloading.
6. Static class members
7. Polymorphism, early binding and late binding
8. C++ type conversion
9. Exception handling
10. Function templates, class templates and container classes.

Textbooks:

1. Budd, T., *An Introduction to Object Oriented Programming*, Second Edition, Addison-Wesley, Pearson Education Asia, ISBN: 81-7808-228-4.
2. R. Lafore, *Object Oriented Programming in Turbo C++*, Galgotia Publications Ltd. India, 1999

Reference Books:

1. E Balaguruswamy, Object Oriented Programming with C++, Third Edition
2. Tata McGraw-Hill ISBN:0-07-059362-0, Parson David, Object Oriented Programming with C++, BPB Publication\ISBN817029-447-9