

Course Title: Computer Fundamentals and Applications (4 Cr.)

Course Code: CACS101

Year/Semester: I/I

Class Load: 8 Hrs. / Week (Theory: 4 Hrs., Practical: 4 Hrs.)

Course Description

This course offers fundamental concepts of computer and computing which includes introduction to computer system, computer software & database management system, operating system, data communication & computer network and contemporary technologies. It also aims at helping students convert theoretical concept into practical skill through the use of different application packages including word processor, spreadsheet package, presentation package and photo editing graphical package.

Course Objectives

The general objectives of this course are to provide fundamental concepts of information and communication technology and to make students capable of using different application packages in their personal as well as professional life.

Course Contents

Unit 1 Introduction to Computer System

16 Hrs.

Introduction to Computer, Characteristics of Computer, Applications of Computer, Classification of Computer, Mobile Computing, Anatomy of a Digital Computer, Computer Architecture, Memory & Its Classification, Input devices, Output Devices, Interfaces.

Unit 2 Computer Software

3 Hrs.

Introduction to Software, Types of Software, Program vs. Software, Computer Virus and Antivirus.

Unit 3 Operating System

4 Hrs.

Introduction to Operating System, Function of Operating System, Types of Operating System, Open Source Operating System.

Unit 4 Database Management System

8 Hrs.

Introduction to DBMS, Database Models, SQL, Database Design and Data Security, Data Warehouse, Data Mining, Database Administrator

Unit 5 Data Communication and Computer Network

10 Hrs.

Introduction to communication system, Mode of Communication, Introduction to Computer Network, Types of Computer Network, LAN Topologies, Transmission Media, Network Devices, OSI Reference Model, Communication Protocols, Centralized vs. Distributed System.

Unit 6 Internet and WWW

6 Hrs.

Internet: Introduction to Internet and its Applications, Connecting to the Internet, Client/Server Technology, Internet as a Client/Server Technology, Email, Video-Conferencing, Internet Service Providers, Domain Name Server, Internet Address, Internet Protocols (IP, TCP, HTTP, FTP, SMTP, POP, Telnet, Gopher, WAIS), Introduction to Intranet, Internet vs. Intranet vs. Extranet, Advantages & Disadvantages of Intranet

World Wide Web (WWW): World Wide Web and Its Evolution, Architecture of Web, Uniform Resource Locator (URL), Browsers: Internet Explorer, Netscape Navigator, Opera, Firefox, Chrome, Mozilla; Search Engine, Web Servers: Apache, IIS, Proxy Server; HTTP Protocol, FTP protocol.

Unit 7 Contemporary Technologies

13 Hrs.

Multimedia, e-Commerce, e-Learning, e-Governance, e-Banking, Hypermedia, Geographical Information System, Virtual Reality, Augmented Reality, Artificial Intelligence, Ambient Intelligence, Robotics, Bit Coin.

Laboratory Works

Laboratory works should cover all the units and topics mentioned below and a project work should be carried out by students individually implementing the concept and skill learnt in this course.

Unit 1 Operating System

10 Hrs.

- GUI Based OS (5 Hrs.):** Interface, GUI vs. CUI, Introduction to Windows, Features, Elements of Windows, Task Bar, Using Menus and Submenus, Opening a Program, Opening Multiple Program, Using Short Cuts, Using My Computer, Switching off the System, Desktop and Custom Wall Papers, Screen Saver, Using Help for Interactive Learning. Using General Accessories: Notepad, Paint Tool, Clip Board, Character Map, Calculator etc.; Using Multimedia: Using CD/DVD/BD, Using Audio/Video; Using Explorer to Manage Files and Folders: Copy/Delete/Rename/Short Cuts; Recycle Bin and Its Uses. Using Format, Scandisk and Disk Defragmenter, Windows Installation and Setting.
- CUI Based OS (5 Hrs.):** Introduction to DOS, DOS Internal Commands, DOS External Commands.

Unit 2 Word Processor

12 Hrs.

Introduction to Word Processor, Features of Word Processor, Elements of Word Window, Creating & Saving Document, Copy Paste and Cut Paste, Format Painter, Undo and Redo, Print Preview, Printing Documents, Fonts, Effect and Character Formatting, Paragraph Formatting, Styles, Finding, Replacing and Selection, Cover Page, Blank Page, Page Break, Working with Table, Inserting Picture, Clip Art, Shapes, Smart Art and Chart, Hyperlink, Bookmarks, Cross-

Referencing, Header, Footer, Page Number, Working with Text Box, Quick Parts, Word Art, Drop Cap, Signature Line, Date & Time, Object, Equation, Symbol, Working with Themes, Page Margins, Page Orientation, Page Size, Columns Handling, Hyphenation, Watermark, Page Color, Page Borders, Indentation, Arranging Objects, Table of Contents, Footnote and Endnote, Citation and Bibliography, Captions, Inserting Index, Table of Authorities, Mail Merge, Spelling and Grammar, Thesaurus, Translation, Word Count, Comments, Tracking, Changes, Compare, Protecting Document, Document Views, Ruler, Gridlines, Document Map, Thumbnails, Zooming, Window Handling, Creating and Using Macro.

Unit 3 Spreadsheet Package

12 Hrs.

Introduction to Spreadsheet Package, Features of Spreadsheet Package, Introduction to Microsoft Excel, Elements of Excel Window, Cell Referencing in Excel: Relative, Absolute, and Mixed; Managing Workbooks, Worksheets, Windows, Working with Worksheet, Printing Worksheet, Using Formulas/functions; Formatting/Conditional Formatting Data & worksheet; Using Paste Special, Essential Worksheet Functions, Using Templates, Protecting the File and Worksheet with Passwords; Working with Graphic Objects: Clip Art, Word Art, Map; Working with Charts, Working with Internal Database, Getting More Power from Worksheet Databases, Accessing External Databases, Loan Amortization Scheduling and Calculation; Data Validation, Consolidating and Outlining, Using What- if Analysis: Data Table, Goal Seek, Scenario Manager; Understanding Pivot Tables, Constructing and Analyzing Pivot Tables, Using Custom Controls on Worksheets, Effectively Using the Macro Recorder

Unit 4 Presentation Package

6 Hrs.

Introduction, Creating and Saving Presentation; Entering, Editing, and Enhancing Text; Editing in different views- Outline View, Slide Sorter View; Creating Graphs, Editing and Enhancing Graphs; Adding ClipArt in Slide, Editing Arts, Animating Charts and Art Objects, Adding Sound, Choosing Sound Effects- Transitional, From Other Sources; Adding Sounds to Animations and Sound Objects; Recording Sound and Narration; Adding Movie in Slides, Playing and Editing Movie; Making Movie Poster and Icon; Slide Show, Setting Slide Transition, Speed and Slide Advancement; Rehearsing Slide Display Timing, Slide Notes and Comments; Editing Text Color, Creating Custom Color; Background and Schemes; Linking and Embedding Objects; Importing and Exporting Presentation; Printing Slides and Handouts

Unit 5 Photo Editing Package

20 Hrs.

Fundamentals

Graphics Basics: Bitmap Vs. Vector-Based Graphics, Color/Bit Depth and Image Resolution, Graphic File Formats, Optimizing Web Graphics, Regular Text Vs.

Anti- Aliased Text, Pixel Resize Vs. Smart Resize, Regular Graphics Vs. Interlaced Graphics, Lossy Compression Vs. Lossless Compression, Dithered Graphics Vs. Non-Dithered Graphics, Standard Selection Vs. Floating Selection, Tolerance, Opacity.

Introduction to Color: Color Modes- RGB, CMYK, Grayscale, LAB, Bitmap; Hue, Saturation, and Brightness; Browser Safe Colors; Shadows, Highlights and Midtones of an Image.

Interface, Tools and Options

Environment: About Photoshop, The Photoshop Interface, Setting up a new Photoshop document, Saving a new document, The Default Palettes, Working with Photoshop Palettes, The Photoshop Toolbox and Options bar, Using Guides and Ruler,

Image and Color Basics: Supported import and export image formats, Opening an Image in Photoshop, Creating Images In Photoshop, Saving Images In Photoshop, Basic Image Editing, Changing Image Size, Cropping an Image, Changing Color/Bit Depth, Optimizing Images using Save for Web, Working with Color in Photoshop

Tools: Parts of the Toolbox, Toolbox Shortcuts, Tools Options, Marquees, Magic wand, Lassos, Move tool, Crop tool, Slice tools, Pencil, Paintbrush, Eraser tools, History brushes, Clone stamp-Pattern stamp, Healing brush tool, Retouch tool, Gradient, Paint bucket, Burn-Dodge-Sponge, Blur-Sharpen-Smudge, Shapes-line- rectangle-polygon-custom shapes, Path selection tool, Pen tool, Type tools, Notes tool-Audio annotation, Eyedropper-Color sampler-Measure tool, Hand-Zoom, Quick mask-Screen modes, Jump to Image Ready, Back ground and Foreground.

Transforms: Using Free transform, Move, Rotate, Scale, Skew, Distort, Perspective, Flip-vertical, horizontal, Invert, Rotate 180°, Rotate 90° CW, Rotate 90° CCW.,

Layers, Channels and Actions

Photoshop Layers: About Layers-Fill and Adjustment Layers, The Layer Palette, Naming Layers, Creating Layers, Deleting Layers, Viewing Layers, Moving Layers, Layer Opacity, Locking Layers, Merging Layers, Layer Modes and Blending Options, Image Compositing Using Layers.

Photoshop Channels: About Channels, The Channel Palette, Creating and Viewing Channels, Modifying Channels, Deleting Channels, Alpha Channels and Masks.

Actions: Using the Action Palette, Recording Action, Playing Action, Editing Action, Loading a Saved Action.

Restoring and Enhancing Images

Restoration of Photos: Restoring Damaged Photos, Photo Retouching.

Photo Enhancement and Color Correction: Changing Levels, Changing Curves, Color Balance, Changing Brightness and Contrast, Changing Hue Saturation and Brightness, Changing a Grayscale Image to a Colored Image, Histogram, Gradient Map, Desaturate, Invert, Color Replace, Selective Color, Equalize, Threshold, Channel Mixer, Posterize, Changing Background using Layer Compositing

Text Editing and Special Effects

Text Editing in PhotoShop: About the Type Layer, Creating Vertical and Horizontal Types, Point and Paragraph Text Creation, Using Horizontal and Vertical Type Mask Tools, Using Character Palette for Text Editing, Choosing a Font, Changing the Type Color, Choosing a Type Size, Specifying Kerning and Tracking, Using Fractional Character Widths, Specifying Baseline Shift, Applying Underline and Strikethrough, Text Alignment and Justification, Specifying Anti-Aliasing, Creating Text Warp, Rasterizing Type, Converting Type to Shapes, Adding Effects to Text

Photoshop Special Effects and Filters: About Special Effects, Using Filters, Basic Filter Examples, Artistic Filters, Distorting Filters, Filter Combinations, Plug-in Filters.

Web Application and Animation

Adobe ImageReady: About Image Ready, Opening Image Ready, The Image Ready Interface, Image Maps, Image Slicing, Basic Animation.

Photoshop for Building Web Interface: About the Interface

Teaching Methods

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and written and verbal examinations.

Evaluation

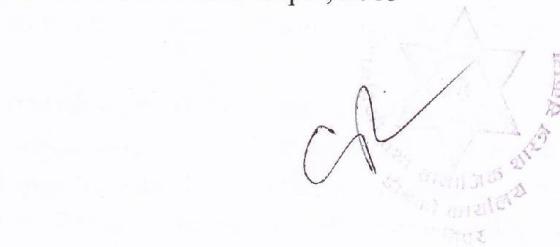
Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

- 1 Alexis Leon, Mathews Leon, "Fundamentals of Information Technology, 2/e", Vikas Publishing House Pvt Limited, 2009, ISBN: 9788182092457
- 2 E Balagurusamy, "Fundamentals of Computers," Tata McGraw Hill Education PVT.Ltd., 2009, ISBN: 9780070141605
- 3 Peter Norton's, "Introduction to Computers", 7th Edition, Tata McGraw-Hill, 2010, ISBN: 9780070671201

Reference Books

- 1 Brad Dayley & DaNae Dayley, "Adobe Photoshop CS6 Bible", Wiley Publishing Inc., 2012, ISBN: 978-1-118-12388-1
- 2 Faithe Wempen, "Microsoft Office Power Point 2007 Bible (With CD)", Wiley Publishing Inc., 2007, ISBN: 978-0470043684
- 3 Herb Tyson, "Microsoft Office Word 2007 Bible (With CD)", Wiley Publishing Inc., 2007
- 4 Jim Boyce, "Windows 7 Bible ", Wiley Publishing Inc., 2009, ISBN: 978-0470509098
- 5 John Walkenbach, "Microsoft Office Excel 2007 Bible (With CD)", Wiley Publishing Inc., 2007, ISBN: 978-0470044032
- 6 Pradeep Sinha and Priti Sinha, "Computer Fundamentals (with CD)", 6th Edition, BPB Publications, 2003, ISBN: 9788176567527
- 7 Ramesh Rimal & et. al., "Computer Science-I, Revised Edition", Buddha Academic Publishers and Distributors Pvt. Ltd. Nepal, 2013
- 8 Ramesh Rimal & et. al., "Computer Science-II, Revised Edition", Buddha Academic Publishers and Distributors Pvt. Ltd. Nepal, 2013



Course Title: **Society and Technology (3 Cr.)**
Course Code: **CACS102**
Year/Semester: I/I
Class Load: **3 Hrs. / Week (Theory: 3 Hrs.)**

Course Description

This course covers several topics of sociology and impact of technology on society that includes basic concept of sociology, organizing social life, social system & social stratification of Nepalese societies, society & technology and research in social sciences which are essential to make computer professionals more responsible towards their society and social norms & values.

Course Objectives

The main objective of this course is to make the students familiar with the disciplines of sociology. The goal is to enable them to analyze the Nepalese society and culture; and to understand the relationship between individual, Society and Culture.

Course Contents

Unit 1 Basic Concept of Sociology **6 Hrs.**

Definition of Sociology, Nature and Scope of Sociology, Relationship of Sociology with Other Social Sciences.

Unit 2 Organizing Social Life **6 Hrs.**

Society: Population size and Distribution, Culture Community, Norms and Values, Status and Role, Institutions: Marriage, Family, Kinship and Groups.

Unit 3 Social System & Social Stratification of Nepalese Societies. **9 Hrs.**

Social Processes & Socialization. Social and Cultural Change in Nepal, Factors of Social and Cultural Change in Nepal, Caste/Ethnicity based Stratification, Gender based Stratification, Religion based Stratification, Ecological based Stratification, National Integration: Historical Process of Nationhood, Cultural Integration (Language, Rituals and Customs).

Unit 4 Society and Technology **12 Hrs.**

Technological Society, Technological Changes in Third World Society, Social and Cultural bases of Technological change, Process and Patterns of Diffusion of Innovation, Consequences of Technological Development on Nepalese Society. Accountability of Computer Professionals towards Society.

Unit 5 Research in Social Science **12 Hrs.**

Concept of Research in Social Science, Understanding the Concept of Research Methods, Techniques and Tools: Interview, Focus Group Discussion, Observation, Qualitative, Quantitative and Mixed Method in Social Research,

Research Proposal and its Components: Identification of Research Problem, Formulation of Objectives, Research Design, Formation of hypothesis/research questions, Sampling design, tool and methods of data collection, Analysis and Presentation of Data, Research Report Writing and Presentation, Computer Softwares on Social Science Research.

Teaching Methods

The general teaching methods includes class lectures, group works and discussions, case studies, guest lectures, research work, project work, assignments and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching method as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
40	-	60 (3 Hrs.)	-	100

Text Books

1. Andersen, M. L. & Taylor, H. F. (2007). Understanding sociology. New Delhi: Cengage Learning India Private Limited.
2. Bista, D.B. (1996). People of Nepal. Kathmandu: Ratna Prakashan
3. Creswell, J. W. (2011). Research design: qualitative, quantitative and mixed methods approach. New Delhi: SAGE
4. Haralambos M & Heald R. M . (2006). Sociology: Themes and perspectives. New Delhi: Oxford University Press

Reference Books

1. Bryman, A. (2008). *Social research methods (3rd ed.)*. New York, New Delhi: Oxford University Press.
2. Central Department of Sociology and Anthropology (1987-2009). *Occasional papers in sociology and anthropology*. Kathmandu.

Course Title: **English I (3 Cr.)**

Course Code: **CACS103**

Year/Semester: **I/I**

Class Load: **4 Hrs. / Week (Theory: 3 Hrs., Tutorial: 1 Hr.)**

Course Description

This course aims at helping students combine the knowledge of the English language with their technical knowledge with special emphasis on vocabulary acquisition and grammatical accuracy. It offers up-to-date technical content, authentic reading and listening passages covering a wide range of topics like the use of virtual reality in industry, personal computing, viruses and security, information systems, and multimedia. Letter-writing section offers a complete guide to writing work-related letters and comprehensive glossary of technical terms forms a useful mini-dictionary of computing terminology.

Course Objectives

The main objectives of the course are to:

- impart effective language skills to students and enable them to use language accurately, clearly and concisely,
- acquaint students with language used in computer study through extensive reading activity,
- help them to enhance their ability to use language in a proper way with specific focus on grammatical accuracy and writing competence,
- enable students to improve work-related letter writing skills with special attention to presentation and structure, and
- familiarize them with innovation in computer science while introducing them with the language used in this field.

Course Contents

A. LEARNING THE LANGUAGE

Unit One

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|--|--------|
| I. Personal Computing
The Processor
Language Focus A: Contextual Reference | 9 Hrs. |
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| II. Portable Computers
Operating Systems
Language Focus B: Word formation, prefixes | |
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| III. Online Services
Data Transmission
Language Focus C: Word formation, suffixes | |
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Unit Two

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|------|--------------------------------------|---------|
| I. | Computer Software | 12 Hrs. |
| | Comparing Software Packages | |
| | Language Focus D: Making Comparisons | |
| II. | Computer Networks | |
| | Network Configurations | |
| | Language Focus E: Time Sequence | |
| III. | Computer in Education | |
| | CALL | |
| | Language Focus F: Giving Examples | |
| IV. | Virtual Reality | |
| | VR Input Devices | |
| | Language Focus G: Classifying | |

B. ORGANIZING AND WRITING TEXTS

Unit Three

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|------|--|--------|
| I. | Programming and Languages | 9 Hrs. |
| | C Languages | |
| | Language Focus H: Organizing Information | |
| II. | Computer Viruses | |
| | Computer Security | |
| | Language Focus I: Listing | |
| III. | Computers in the Office | |
| | Computer System | |
| | Language Focus J: The Passive | |

Unit Four

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|-----|--|--------|
| I. | Computers in Medicine | 6 Hrs. |
| | Data Storage and Management | |
| | Language Focus K: Explanations and Definitions | |
| II. | Robotics | |
| | Robot Characteristics | |
| | Language Focus L: Compound Noun | |

Unit Five

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| I. | Machine Translation | 9 Hrs. |
| | AI and Expert System | |
| | Language Focus M: Cause and Effect | |

II. Multi Media

Computer-to-video-conversion

Language Focus N: Making Predictions

III. Computer Graphics

24 bit Color

Language Focus O: Letter Writing

Teaching Methods

The course expects communicative language teaching (CLT). Facilitating the learning process, the instructors are expected to stimulate the students to work as per the spirit of the course and make learning a joyful experience.

Evaluation

Internal Evaluation: 40%

Attendance - 5

Presentation/classroom participation- 5

Writing sample- 15

Mid-term test- 15

Final Evaluation- 60%

Comprehension

Vocabulary formation

Grammar testing

Writing of multiple forms

Prescribed Textbook

1. Boeckner, Keith and P. Charles Brown. *Oxford English for Computing*. London: Rutledge, 1993.



Course Title: **Mathematics I (3 Cr.)**

Course Code: **CACS104**

Year/Semester: **I/I**

Class Load: **5 Hrs. / Week (Theory: 3 Hrs., Tutorial: 1 Hr., Practical: 1 Hr.)**

Course Description

This course includes several topics from algebra and analytical geometry such as set theory and real & complex number; relation, functions and graphs; sequence and series; matrices and determinants; permutation & combination; conic section and vector in space which are essential as mathematical foundation for computing.

Course Objectives

The general objective of this course is to provide the students with basic mathematical skills required to understand Computer Application Courses.

Course Contents

Unit 1 Set Theory and Real & Complex Number **7 Hrs.**

Concept, Notation and Specification of Sets, Types of Sets, Operations on Sets (Union, Intersection, Difference, Complement) and their Venn diagrams, Laws of Algebra of Sets (without proof), Cardinal Number of Set and Problems Related to Sets. Real Number System, Intervals, Absolute Value of Real Number. Introduction of Complex Number, Geometrical Representation of Complex Number, Simple Algebraic Properties of Complex Numbers (Addition, Multiplication, Inverse, Absolute Value)

Unit 2 Relation, Functions and Graphs **8 Hrs.**

Ordered pairs, Cartesian product, Relation, Domain and Range of a relation, Inverse of a relation; Types of relations: reflective, symmetric, transitive, and equivalence relations. Definition of function, Domain and Range of a function, Inverse function, Special functions (Identity, Constant), Algebraic (linear, Quadratic, Cubic), Trigonometric and their graphs. Definition of exponential and logarithmic functions, Composite function.(Mathematica)

Unit 3 Sequence and Series **7 Hrs.**

Sequence and Series (Arithmetic, Geometric, Harmonic), Properties of Arithmetic, Geometric, Harmonic sequences, A. M., G. M., and H. M. and relation among them. Sum of Infinite Geometric Series. Taylor's Theorem (without proof), Taylor's series, Exponential series.

Unit 4 Matrices and Determinants **8 Hrs.**

Introductions of Matrices, Types of Matrices, Equality of Matrices, Algebra of Matrices, Determinant, Transpose, Minors and Cofactors of Matrix. Properties of determinants (with out proof), Singular and non-singular matrix, adjoin and

inverse of matrices. Linear transformations, orthogonal transformations; rank of matrices. (Matlab)

Unit 5 Analytical Geometry 8 Hrs.

Conic Sections: Definitions (Circle, Parabola, Ellipse, Hyperbola and Related Terms), Examples to Explain The Defined Terms, Equations and Graphs of The Conic Sections Defined Above, Classifying The Defined Conic Sections by Eccentricity and Related Problems, Polar Equations of Lines, Circles, Ellipse, Parabolas, and Hyperbolas. (Mathematica / Matlab)

Vectors in Space: Vectors in Space, Algebra of Vectors in Space, Length, Distance Between Two Points, Unit Vector, Null Vector. Scalar Product, Cross Product of Two and Three Vectors and Their Geometrical Interpretations and Related Examples. (Matlab)

Unit 6 Permutation and Combination 7 Hrs.

Basic Principle of Counting, Permutation of a. Set of Objects All Different b. Set of Objects Not All Different c. Circular Arrangement d. Repeated Use of The Same Object. Combination of Things All Different, Properties of Combination.

Laboratory Works

Mathematica and/ or Matlab should be used for above mentioned topics.

Teaching Methods

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

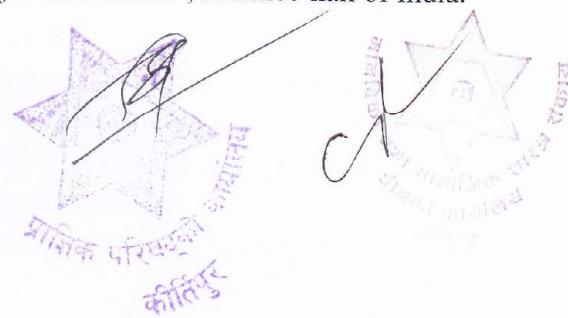
Examination Scheme					
Internal Assessment		External Assessment		Total	
Theory	Practical	Theory	Practical		
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100	

Text Book

1. Thomas, G. B, Finney, R. S., "Calculus with Analytic Geometry", Addison - Wesley, 9th Edition.

Reference Books

1. Bajracharya D. R., Shreshtha, R. M. & et al, "Basic Mathematics I, II" Sukunda Pustak Bhawan, Nepal
2. Budnick, F. S., "Applied Mathematics for Business, Economics and the Social Sciences", McGraw-Hill Ryerson Limited.
3. Monga, G. S., "Mathematics for Management and Economics", Vikas Publishing House Pvt. Ltd., New Delhi.
4. Paudel, K. C., GC. F. B., and et. al, "Higher Secondary Mathematics", Asmita Publication & Distributors Pvt. Ltd, Nepal.
5. Upadhyay, H. P., Paudel, K.C & et al, "Elements of Business Mathematics", Pinnacle Publication.
6. Yamane, T. "Mathematics for Economist", Prentice-hall of India.



Course Title: **Digital Logic (3 Cr.)**

Course Code: **CACS105**

Year/Semester: **I/I**

Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Practical: 2 Hrs.)**

Course Description

This course presents an introduction to Digital logic techniques and its practical application in computer and digital system.

Course Objectives

The course has the following specific objectives:

- To perform conversion among different number systems
- To simplify logic functions
- To design combinational and sequential logic circuit
- To understand industrial application of logic system.
- To understand Digital IC analysis and its application
- Designing of programmable memory

Course Contents

Unit 1 Introduction

2 Hrs.

- 1.1 Digital Signals and Wave Forms
- 1.2 Digital Logic and Operation
- 1.3 Digital Computer and Integrated Circuits (IC)
- 1.4 Clock Wave Form

Unit 2 Number Systems

5 Hrs.

- 2.1 Binary, Octal, & Hexadecimal Number Systems and Their Conversions
 - 2.1.1 Representation of Signed Numbers-Floating Point Number
 - 2.1.2 Binary Arithmetic
- 2.2 Representation-of BCD-ASCII-Excess 3 -Gray Code –Error Detecting and Correcting Codes.

Unit 3 Combinational Logic Design

16 Hrs.

- 3.1 Basic Logic Gates NOT, OR and AND
- 3.2 Universal Logic Gates NOR and NAND
- 3.3 EX-OR and EX-NOR Gates
- 3.4 Boolean Algebra:
 - 3.3.1 Postulates & Theorems
 - 3.3.2 Canonical Forms - Simplification of Logic Functions
- 3.5 Simplification of Logic Functions Using Karnaugh Map.
 - 3.5.1 Analysis of SOP And POS Expression
- 3.6 Implementation of Combinational Logic Functions
 - 3.6.1 Encoders & Decoders

- 3.6.2 Half Adder, & Full Adder
- 3.7 Implementation of Data Processing Circuits
 - 3.7.1 Multiplexers and De-Multiplexers
 - 3.7.2 Parallel Adder -Binary Adder-Parity Generator /Checker-Implementation of Logical Functions Using Multiplexers.
- 3.8 Basic Concepts of Programmable Logic
 - 3.8.1 PROM
 - 3.8.2 EPROM
 - 3.8.3 PAL
 - 3.8.4 PLA

Unit 4 Counters & Registers 16 Hrs.

- 4.1 RS, JK, JK Master - Slave, D & T Flip flops
 - 4.1.1 Level Triggering and Edge Triggering
 - 4.1.2 Excitation Tables
- 4.2 Asynchronous and Synchronous Counters
 - 4.2.1 Ripple Counter: Circuit and State Diagram and Timing Waveforms
 - 4.2.2 Ring Counter: Circuit and State Diagram and Timing Waveforms
 - 4.2.3 Modulus 10 Counter: Circuit and State Diagram and Timing Waveforms
 - 4.2.4 Modulus Counters (5, 7, 11) and Design Principle, Circuit and State Diagram
 - 4.2.5 Synchronous Design of Above Counters, Circuit Diagrams and State Diagrams
- 4.3 Application of Counters
 - 4.3.1 Digital Watch
 - 4.3.2 Frequency Counter
- 4.4 Registers
 - 4.4.1 Serial in Parallel out Register
 - 4.4.2 Serial in Serial out Register
 - 4.4.3 Parallel in Serial out Register
 - 4.4.4 Parallel in Parallel out Register
 - 4.4.5 Right Shift, Left Shift Register

Unit 5 Sequential Logic Design 6 Hrs.

- 5.1 Basic Models of Sequential Machines
 - Concept of State
 - State Diagram
- 5.2 State Reduction through Partitioning and Implementation of Synchronous Sequential Circuits
- 5.3 Use of Flip-Flops in Realizing the Models
- 5.4 Counter Design

Laboratory Works

1. Gates using Active and Passive Elements
2. Half Adder and Full Adder
3. 16:1 Multiplexer
4. 1:16 Demultiplexer
5. Digital Watch by Counters
6. Shift Resistors

Teaching Methods

The general teaching methods includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and exams, depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. Floyd, "Digital Fundamentals", PHI.
2. Morris Mano, "Digital Design", Prentice Hall of India.
3. Tocci.R.J, "Digital systems-Principles & Applications"-Prentice Hall of India.

Reference Books

1. B. R. Gupta and V.Singhal, "Digital Electronics" 4th Edition, S.K Kataria & sons, India.
2. Fletcher.W.I., "An Engineering Approach to Digital Design", Prentice Hall of India.
3. Millman & Halkias, "Integrated Electronics".
4. V.K.PURI, "Digital Electronics", TMH.