

Pokhara University
Faculty of Science and Technology

Course Code: ENG 121 (3 Credits)	Full Marks: 100
Course Title: English for IT Professionals (3-3-1)	Pass Mark: 45
Nature of the Course: Theory + Practical	Total Lectures: 45 hours
Level: Bachelor/ Year: I Semester: I	Program: Bachelor of Computer Application

1. Course Description:

This course is designed to cover grammar, vocabulary, reading and writing components. Grammar incorporates the essential aspects of technical English usage in context. Vocabulary covers words from different academic fields. The reading component deals with a wide variety of carefully selected materials. They include, among other things, informative passages on contemporary and critical issues. The writing part includes materials geared to developing various writing skills required for effective communication on matters of general and academic interests.

2. General Objectives:

The general objectives of this course are as follows:

- a) To enhance the students' understanding of the grammatical system and its uses,
- b) To expand the students' repertoire of general and academic vocabulary,
- c) To familiarize students with the techniques of using vocabulary,
- d) To develop in students an ability to comprehend and interpret different kinds of written texts by exposing them to a wide variety of authentic contemporary text materials,
- e) To develop in students, the different kinds of writing skills needed for effective communication on matters of general and academic interests.

3. Methods of Instructions:

- Lecture and discussion
- Demonstration
- Presentation
- Explanation and illustration
- Group and individual work
- Project work
- Self-study etc.

It is expected that students are fully engaged with the teacher in subject matters and lessons to excel their interactive and presentation skills.

Specific Objectives

Course Content

Unit 1: Foundations of English Language

8 hrs

<ul style="list-style-type: none"> • Explain the basic concept of structures of English and academic language, focus on grammatical structures and developing vocabularies 	<ol style="list-style-type: none"> 1.1 Introduction to English Language 1.2 Academic English Basics 1.3 Parts of Speech 1.4 Word formation: prefixes and suffixes 1.5 Synonyms and antonyms
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	1.6 Phrasal verbs 1.7 Sentence structures: Simple, compound and complex 1.8 Voice- Active and passive voice 1.9 Verities of English
Unit 2: English Language Terminology 6 hrs	
<ul style="list-style-type: none"> Describe the role of appropriate tenses, prepositions and articles Explain the use of supply the appropriate words 	2.1 Tense 2.2 Prepositions 2.3 Article 2.4 Word order 2.5 Countable and uncountable nouns 2.6 Conjunctions, relative clauses
Unit 3: Review and Critical Thinking 5 hrs	
<ul style="list-style-type: none"> Explain the role of critical analysis, reviews orally 	3.1 Film shows and concerts. 3.2 Evaluating and emphasizing. 3.3 Oral presentation of reviews
Unit 4: General Communication Skills 5 hrs	
Course Content	Specific Objectives
<ul style="list-style-type: none"> Describe the objectives and characteristics of Communication Explain the ways of develop effective presentation strategies 	4.1. Listening and speaking 4.2. Active listening 4.3. Effective speaking 4.4. Effective presentation strategy 4.5. Group communication
Unit 5: Reading and Writing 5 hrs	
<ul style="list-style-type: none"> Compare the ideas for reading texts and extract general ideas 	5.1 Reading and its techniques 5.2 Technical writing 5.3 Paragraphs and essays
Unit 6: Leading and Misleading of Technical Communication 5 hrs	
Explain for the workplace; Style in technical prose	6.1 Ethics at work 6.2 Ethics at framework 6.3 Ethics for students 6.4 How is ethics related to technical communication? 6.2 Writing ethically
Unit 7: The Essentials of writing 10 hrs	
<ul style="list-style-type: none"> Describe the various technical essays Explain the characteristics of writing 	7.1 The Structure of an Essay 7.1.1 The Introduction 7.1.2 Body Paragraphs 7.1.3 The conclusion 7.2 The writing processes
Unit 8: Reading Comprehension and Summery Writing 6 hrs	

<ul style="list-style-type: none"> Explore on language construction and find the theme 	8.1 Note taking, summery and precis writing. 8.2 Computer makes the world smarter and smaller (Nancy Stern & Robert A. Stern) 8.3 How to become a programming expert?(Erich H. & John Ewan) The future of information technology (Erich H. & John Ewan).
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Note: To make class more practical oriented, teachers are requested to devise appropriate tutorials with practical work.

5. Evaluation System and Students' Responsibilities

Evaluation System

The internal evaluation of a student may consist of assignments, attendance, term-exams, lab reports and projects etc. The tabular presentation of the internal evaluation is as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theory		50	Semester End	50
Attendance & Class Participation	5			
Assignments	5			
Presentations/Quizzes	5			
Internal Assessment	25			
Practical Test	10			
Total Internal		50		
Full Marks: 50 + 50 = 100				

Students' Responsibilities

Each student must secure at least 45% marks separately in internal assessment and practical evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

8. Prescribed Books and References

Text Book:

Oxford English for Information Technology (Erich H. & John Ewan)

Reference Books:

- Jones, L., 1991. Cambridge Advanced English.
- Swan, M. (2005). *Practical English Usage* (Vol. 688). Oxford: Oxford university press.
- Raman, M. and Sharma, Sangeeta, (2020). Technical Communication Principles and

Practice.

4. Gardner, P., 2005. *New directions: Reading, writing, and critical thinking*. Cambridge University Press.
5. Awasthi, J.R., Bhattarai, G.R. and Rai, V.S., 2015. *English for the new millennium*.
6. Graves, H. and Graves, R., 2012. *A Strategic Guide to Technical Communication-(US)*. Broadview Press.

Pokhara University
Faculty of Science and Technology

Course Code: MTH 131 (3 Credits)	Full Marks: 100
Course Title: Mathematics I (3-3-0)	Pass Mark: 45
Nature of the Course: Theory	Total Lectures: 48 hours
Level: Bachelor/ Year: I/ Semester: I	Program: Bachelor in Computer Application

1. Course Description:

This course includes set theory and real number system, functions and graphs, differential calculus and its application, partial derivative and its application, symbolic logics, matrices and determinants which are essential as mathematical foundation for computing.

2. General Objectives:

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

3. Methods of Instructions:

Lecture, Tutorial, Discussion, Assignments and Practical works.

4. Contents in Detail

Specific Objectives	Contents
<ul style="list-style-type: none"> Solve problems related to sets, Absolute value and intervals. 	<p>Unit T: Set Theory and Real Number (6 Hrs.)</p> <p>1.1 Introduction 1.2 Types of sets 1.3 Operations on Sets (Union, Intersection, Difference, Complement) 1.4 Venn diagram 1.5 Cardinal Number of Set and Problems Related to Sets 1.6 Real Number 1.6.1 Types of real numbers 1.7 Absolute value of real numbers 1.8 Open and closed intervals</p>
<ul style="list-style-type: none"> Solve the problem related to functions and graph Identify and plot the curves using any software tools (MATLAB/ Octave/ Mathematica, etc.) Solve inequality and draw in graph. 	<p>Unit 2: Functions and Graphs (5 Hrs)</p> <p>2.1 Definition of function 2.2 Domain and Range of a function 2.3 Inverse function 2.4 Type of functions : Constant, Algebraic (linear, Quadratic, Cubic), Trigonometric, exponential and Logarithmic and their graphs. Composite function. 2.5 Linear inequality and their graph (up to two variables)</p>
<ul style="list-style-type: none"> Solve the problems related to limit, 	<p>Unit 3: Limits & Continuity of Functions (5 Hrs.)</p>

continuity, discontinuity, demand and profit function.	3.1 Introduction 3.2 Limit of functions 3.3 Continuity & discontinuity of functions 3.4 Demand & Profit function
<ul style="list-style-type: none"> Solve the problems related to derivative and its applications. For visualization of curve use any software tools (MATLAB/ Octave/ Mathematica, etc) 	Unit 4: Derivative and it's application (10 Hrs.) 4.1 Introduction 4.2 Techniques of differentiation 4.3 Derivative of algebraic, exponential, logarithmic & simple trigonometric functions. 4.4 Higher order derivative (up to 3 rd order) 4.5 Application of derivative 4.5.1 Technique of finding limits (using L-hospital rule) 4.5.2 Increasing & decreasing function 4.5.3 Maxima & minima of function of one variable 4.5.4 Concavity of the function 4.5.5 Inflection point 4.6 Average cost & Marginal cost 4.6.1 Average revenue & marginal revenue 4.6.2 Profit maximization under perfect competition 4.6.3 Profit maximization under monopoly
Find partial derivatives and its applications.	Unit 5: Multivariable functions and Partial Derivatives (8 Hrs.) 5.1 Introduction 5.2 Partial derivatives 5.3 Homogeneous function 5.4 Euler's theorem 5.5 Extreme values and saddle points for multivariable functions. 5.6 Lagrange multipliers
Solve the problems related to Logics.	Unit 6: Symbolic Logics (6 Hrs.) 6.1 Introduction 6.2 Statements 6.3 Logical connectives 6.4 Conjunction, Disjunction, Negation, conditional or Implication, Bi-conditional 6.5 Logical equivalence 6.6 Negation of compound events 6.7 Tautology & contradiction 6.8 Mathematical induction
<ul style="list-style-type: none"> Solve the problems related to matrices and determinants. Operation of matrices and determinants by using any software tools (MATLAB/ Octave/ 	Unit 7: Matrices and Determinant (8 Hrs.) 7.1 Introductions of Matrices 7.2 Types of Matrices 7.3 Equality of Matrices 7.4 Algebra of Matrices 7.5 Transpose, Minors and Cofactors of Matrix 7.6 Determinant

Mathematical, etc.)	7.7 Properties of determinants 7.8 Inverse of matrices 7.9 Singular and non-singular matrix 7.10 Solution of Linear equation by matrix inversion method, Cramer's rule, Gauss elimination method
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5. List of Tutorials.	
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1.	Problem of sets, absolute value and intervals.
2.	Function and graph, domain and range, linear inequality and their graph.
3.	Limits, continuity, demand and profit function.
4	Derivative of algebraic, exponential, logarithmic & simple trigonometric functions. Higher order derivative, Increasing & decreasing function, Maxima & minima of function of one variable, Average cost & Marginal cost, Profit maximization under perfect competition, Profit maximization under monopoly.
5	Partial derivative, Verification of Euler's theorem, Extreme values and saddle points for multivariable functions, Lagrange multipliers.
6	Exercise for each topic, Mathematical induction.
7	Algebra of Matrices, Transpose, Minors and Cofactors of Matrices, Evaluation of determinant by using properties, Inverse of matrices, Solution of Linear equations.

6. List of Practical by using MATLAB/Mathematica/Octave/other software tools	
1.	Visualization of Functions and Graphs
2.	Visualization of increasing and decreasing functions, maxima and minima
3.	Visualization of Multivariable functions
4.	Operation on Matrices and Determinant
5.	Solution of Linear equation by matrix inversion method.

5. Evaluation System and Students' Responsibilities

Evaluation System

The internal evaluation of a student may consist of assignments, attendance, term-exams, lab reports and projects etc. The tabular presentation of the internal evaluation is as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theory		50	Semester End	50
Attendance & Class Participation	10%			
Assignments	20%			
Presentations/Quizzes	10%			
Internal Assessment	60%			

Total Internal		50	
Full Marks: 50 + 50 = 100			

Students' Responsibilities

Each student must secure at least 45% marks in internal evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

8. Prescribed Books and References

Text Books:

1. Budnick F.S. *Applied Mathematics for Business Economics and the Social Sciences* McGraw-Hill Ryerson Limited
2. Thomas and Finney *Calculus* Pearson

References:

1. D.R. Bajracharya, R.M. Shrestha & et al, *Basic Mathematics I, II*, Sukunda Pustak Bhawan, Nepal
2. Rudra Pratap *Getting Started with MATLAB*, Oxford University Press 2010
3. Yamane, Taro: *Mathematics for Economist*, Prentice Hall of India
4. K.K. Shrestha & R. K. Thagurathi, *Applied Mathematics*

Pokhara University
Faculty of Science and Technology

Course No.: ELX 111 (3 Credits)
Course title: Digital Logic Systems (3-3-1)
Nature of the course: Theory and Practical
Year: Semester I
Level: Undergraduate

Full marks: 100
Pass marks: 45
Time per period: 1 hour
Total periods: 48
Program: BCA

1. Course Description

This course is designed to covers the concepts of digital logic systems. This course includes the role of information representation, fundamental concept of computing, principles and properties of Boolean algebra and its application in simplification, circuit analysis and gate implementation. It also covers the use of flip flops in the design of synchronous and asynchronous sequential logic circuits. Finally, students will be capable to study functional units of simple computer ALU. Group discussion, lab works, simulation through software tools and implementation of grouped project are major instructional approach.

2. General Objectives

The course is designed with the following general objective:

- To provide basic knowledge of logic systems.
- To familiarize student with the basic tools to study various digital circuits.
- To develop the skill among the student about to analyze the problem and develop concept for software development.

3. Methods of Instruction

- Lecture
- Tutorial
- Laboratory work
- Group discussion
- Grouped project work

4. Contents in Detail

Specific Objectives	Contents
<ul style="list-style-type: none">• Explain the number representation in different number systems and their conversions• Identify the method of computing and role of complements in subtraction• Compare among binary codes,	<p>Unit 1 : Number system and Coding (8 hrs)</p> <ul style="list-style-type: none">1.1 Analog and digital system- introduction and advantages1.2 Digital computer and numerical representation1.3 Number system<ul style="list-style-type: none">1.3.1 Decimal1.3.2 Binary1.3.3 Octal1.3.4 Hexadecimal1.4 Conversion among binary, octal, decimal and

<p>alphabets and other characters in secure computing.</p>	<p>Hexadecimal number systems</p> <p>1.5 Complements (Radix and diminished radix for binary and decimal only)</p> <p>1.6 Subtraction using complements</p> <p>1.7 Codes</p> <p> 1.7.1 Weighted codes (BCD, 84-2-1, 2421)</p> <p> 1.7.2 Non weighted codes (Excess 3, Gray)</p> <p>1.8 Alphanumeric and instruction codes</p>
<ul style="list-style-type: none"> • Interpret facts, theorems and principles based on Boolean algebra. • Emphasize on logic gates, Boolean function and truth tables and gate implementation. 	<p>Unit 2 : Boolean algebra and Logic gates (5 hrs)</p> <p>2.1 Basic definition and properties of Boolean algebra</p> <p>2.2 Postulates and theorems of Boolean algebra</p> <p>2.3 Logic gates, truth tables and Boolean function</p> <p>2.4 Duality principle and complements</p> <p>2.5 Implementation of NAND and NOR gates</p>
<ul style="list-style-type: none"> • Explain the Boolean function simplification methods • Identify role of don't care conditions while simplifying Boolean functions. 	<p>Unit 3 : Simplification of Boolean functions (6 hrs)</p> <p>3.1 Venn diagram</p> <p>3.2 Canonical forms and standard forms</p> <p>3.3 Karnaugh map up to four variables</p> <p>3.4 Don't care conditions</p> <p>3.5 Simplification in SOP and POS using K-map</p>
<ul style="list-style-type: none"> • Describe how to design various combinational logic circuits • Describe internal logic diagram, operation and circuit implementation 	<p>Unit 5 : Combinational logic (10 hrs)</p> <p>4.1 Adders and Subtractors</p> <p>4.3 Code conversion</p> <p>4.4 Analysis procedure</p> <p>4.5 NAND and NOR implementation</p> <p>4.6 Parity generation and checking</p> <p>4.7 Binary Parallel adder and subtractor</p> <p>4.8 BCD adder</p> <p>4.9 Decoder and encoder</p> <p>4.10 Multiplexer and demultiplexer</p> <p>4.11 ROM and PLA</p>
<ul style="list-style-type: none"> • Explain the type of flip flops with their role in sequential circuits • Identify the key characters of each flip-flop for Implementation 	<p>Unit 5 : Sequential logic (6 hrs)</p> <p>5.1 Block diagram of sequential circuit</p> <p>5.2 Flip flop (RS, D, JK, T, Master-slave), truth table, excitation table and characteristic equation</p> <p>5.3 Triggering of flip flops</p> <p>5.4 State diagram and state table</p>

<ul style="list-style-type: none"> • Describe about registers, shift registers and types with timing sequences • Design synchronous, asynchronous and Mod counters 	<p>Unit 6 : Registers and Counters (5 hrs)</p> <p>6.1 Register, Register with parallel load 6.2 Shift register and types of shift register 6.3 Ripple counters (Binary and BCD counter) 6.4 Up-down counter, Mod-6 counter, Johnson</p>
<ul style="list-style-type: none"> • Describe about read and write operation in RAM • Describe about the processor unit and its diagram 	<p>Unit 7 : Functional Units of Memory and ALU (8 hrs)</p> <p>7.1 Random access memory 7.2 Arithmetic logic unit 7.3 Status register 7.4 Processor unit</p>

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

5. Laboratory work:

- Familiarization with logic gates.
 - Familiarization with boolean functions.
 - Design of simple combinational circuits.
 - Adder and subtractor
 - Encoder and decoder
 - Multiplexer and demultiplexer
 - Demonstration of working principles of flip flops.
- Experiments are demonstrative either in trainer Kit or Simulation using appropriate software.*

6. Evaluation system and Students' Responsibilities

Internal Evaluation

In addition to the formal exam(s), the internal evaluation of a student may consist of quizzes, assignments, lab reports, projects, class participation, etc. The tabular presentation of the internal evaluation is as follows. The components may differ according to the nature of the subject.

External Evaluation	Marks	Internal Evaluation	Weight	Marks
Semester-End examination	50	Assignments	12%	6
		Attendance	6%	3
		Unit test	14%	7
		Assessment	28%	14
		Practical	40%	20
Total External	50	Total Internal	100%	50
Full Marks 50+50 = 100				

Student Responsibilities:

Each student must secure at least 45% marks in internal evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) and the student will not be eligible to appear the End-Term examinations. 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 the period. If a student fails to attend a formal exam, quiz, test, etc. there won't be any provision for re-exam.

7. Prescribed Books and References**Text Book**

1. M. Morris Mano, *Digital Logic and Computer Design* Pearson India, 2017.

Reference Book

1. M. Morris Mano, *Digital Design* California State University, Los Angeles.
2. A. Anand Kumar, *Fundamental of Digital Circuits*, Fourth Edition, PHI Learning Private Limited, 2016.

Pokhara University
Faculty of Science and Technology

Course Code	: CMP 116	Full Marks	: 100
Course Title	: Computer Fundamentals and Applications (3-3-2)	Pass Marks	: 45
Nature of the Course	: Theory and Practical	Total Lecture Hours	: 48
Level	: Bachelor	Program	: BCA

1. Course Description

This course is designed to conceptualize the computer fundamental knowledge and its application to solve the real-life problems. This course covers the concept of computer, computer organization, software, hardware, functional behavior of peripherals and important accessories, data communication, computer networks and burning technologies. In this syllabus unit I and II covers the fundamental concept of computer; unit III and VII covers the software, unit IV and V covers the hardware where unit VI and VIII covers the data sharing tools and trends.

2. Course Objectives

The general course objectives of this course are outlined as:

1. to familiarize the student with fundamental knowledge about computer system
2. to make the student knowledgeable about software and its working procedure
3. to enhance the knowledge about various components as input, storage, processing and output devices
4. to equip the student about assembling and disassembling, general maintenance and networking the computers

3. Methods of Instruction

The medium of instruction is English and the faculty members can apply the various tools and techniques for teaching methodologies. As per the student's ability subject teachers faculties have their rights to use the teaching methodologies like Class Room/Lecture-based, Discussion-based, Project-based learning(PBL), Problem-based Learning (PBL), Flipped Classroom-based, Active Learning, Socratic Method, Cooperative Learning, Experimental Learning, Gamification, Inquiry-based Learning, Constructivist Approach, Collaborative Learning, Direct Instruction, Differentiated Instruction, Montessori Method, Reggio Emilia Approach, Waldorf Education, Peer Teaching etc. are called alternative method of teaching to motivate the students for learning. After completion of each unit, faculty members can evaluate the students theoretically and practically as well as whenever possible. They can conduct VIVA, Supersized test, Questionnaire test, Assignment test, Project work and Practical work, even Terminal examination as per the requirement.

4. Course Contents in Details

Specific Unit wise Objective	Course Contents
Unit 1: Introduction to Computer	5 hours
1) Explain the conceptual knowledge of computer with historical and generation background	1.1 Definition 1.2 History of computer 1.3 Generation of computer
2) Describe the types of computer with characteristics and applications	1.4 Types of Computer 1.5 Characteristics of computer 1.6 Applications of computer

Unit 2: Basic Organization of Computer	
	4 hours
1) Explain the organization of computer with their functional components 2) Describe the working mechanism of computer system	2.1 Basic function of computer 2.2 Basic functional organization of computer 2.2.1 Input unit 2.2.2 Output unit 2.2.3 Storage unit 2.2.4 Arithmetic and logic unit 2.2.5 Control unit 2.2.6 Central Processing Unit (CPU) 2.3 The system concept
Unit 3: Computer Software	
	6 hours
1) Describe the concept of computer software with their roles 2) Explain the software architectures their application	3.1 Introduction to software 3.2 Logical system architecture 3.3 Types of software 3.3.1 System Software 3.3.2 Application Software 3.3.3 Utility Software 3.4 Firmware 3.6 Middleware
Unit 4: Computer Accessories	
	9 hours
1) Familiarized with input and output accessories with their application 2) Identify the role of agronomical design in related devices	4.1 The Input Accessories 4.1.1 Keyboard Devices 4.1.2 Point and Draw Devices 4.1.3 Yoke 4.1.4 Data Scanning Devices 4.1.5 Digitizer 4.1.6 Microphone 4.1.7 Electronic Cards Based Devices 4.1.8 Speech Recognition Devices 4.1.9 Vision Based Devices 4.2 The Output Accessories 4.2.1 Monitor 4.2.2 Printer 4.2.3 Plotter 4.2.4 GPS 4.2.5 Projectors 4.2.6 Headphones 4.2.7 Soundcard/video Card 4.2.8 Speaker 4.2.9 Voice Response System 4.2.10 Computer Output Microfilm (COM) 4.2.11 SGD Speech Generation Device 4.3 Ergonomically Designed Devices
Unit 5: Storage Devices	
	7 hours
Specific Unit wise Objective	Course Contents
1) Describe the characters of primary and secondary storage devices 2) Explain the function and behavior of different types of memories .	5.1 Introduction 5.2 Types of Storage Devices 5.3 Cache memory 5.4 Registers 5.5 Primary Memory

	5.5.1 Introduction 5.5.2 Characteristics of main memory 5.5.3 Types of primary memory 5.5.4 Difference between RAM and ROM, DRAM and SRAM, primary and secondary memory 5.6 Secondary Memory 5.6.1 Introduction 5.6.2 Characteristics of secondary memory 5.6.3 Types of Secondary memory 5.6.4 Difference between Hard disk and SSD, magnetic and optical disk, direct and sequential access magnetic memory
Unit 6: Data Communication and Computer Network	
	5 hours
1) Interpret the method of data communication including transmission modes and media 2) Explain the relationship of computer network and topologies with their advantages and disadvantages 3) Compare the role of email and internet in modern life	6.1 Data Communication 6.1.1 Introduction 6.1.2 Basic Elements of a communication system 6.1.3 Data Transmission Modes (Simplex, Half Duplex, Full Duplex) 6.1.4 Data transmission Speed (Narrowband, Voice band, Broadband) 6.1.5 Data Transmission Media (Twisted-pair wire, coaxial cable, Optical fibers, Microwave system Communication satellite) 6.2 Computer Network 6.2.1 Definition 6.2.2 Types of Computer Network (PAN, LAN, CAN, MAN and WAN), Differences, advantages disadvantages 6.2.3 Network Topologies, advantages, disadvantages 6.2.4 Intranet, Extranet, Internet 6.2.5 E-mail
Unit 7: Operating System	
	6 hours
1) Explain the features of operating system and its historical background 2) Describe the functional and architecture behaviors of various type of OS. 3) Explain the different installation methods for operating system	7.1 Introduction 7.2 History and evolution of OS 7.3 Objective of OS 7.4 Generation of OS 7.5 Functions of OS 7.6 Types of OS 7.7 System architecture of OS 7.8 Different between GUI and TUI/CUI 7.9 The booting system 7.10 Windows/ Linux operating system, settings, properties and installation guides
Unit 8: AI and Emerging Technologies	
	6 hours
1. Familiarize with Artificial Intelligence and its applications. 2. Explain about emerging trends of technologies.	8.1 Introduction to AI 8.2 AI and its Applications 8.2.1 Natural Language Processing 8.2.2 Machine vision 8.2.3 Expert system 8.3 Machine Learning 8.4 Neural Networks

	8.5 Blockchain technology 8.6 IoT 8.7 Cloud Computing 8.8 Cyber Security
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5. Laboratory Work

A. Office Automation

a) Word-processing

1. Basic options of word-processing for typing, editing, formatting, margin setting, viewing, designing, printing a document.
2. Creating, insetting, editing, formulating table for word-processing
3. Document preparation with table, figure, page number, margin setting etc. and printing document as a report submission.

b) Spreadsheet

1. Preparing sheet for data processing like, arithmetic, logical and other types of functional operation
2. Preparing data table for calculation, analysis and creating various charts for presentation.
3. Inserting picture, table, graphs into word-processing
4. Printing documents after proper setting into the required format.

c) Presentation

1. Creating various types of slides with master slide for presentation
2. Setting the slide into the required format.

B. Email and Internet

1. Setting various kinds of email account and using them for personal and group purpose
2. Uploading and downloading the information form internet.

6. Prescribed Books and References

Text Books

P.K. and Priti Sinha, *Foundations of Computing*, BPB Publications, Third Edition

References Books

- a. A Text Book of Computer Fundamental and Application, OCEM Publication, (Second Edition), by Prof. Er. Hari Bhandari
- b. Computer Fundamentals, BPB Publications by V.K Jain
- c. Fundamental of Computers, by Balagurusamy E., New Delhi: Tata Mcgraw Hill.

7. Evaluation System

Student academic performance is assessed through internal and external methods. Internal evaluation is carried out by faculty members, monitoring day-to-day student progress. On the other hand, external evaluation is conducted by the university, involving semester-end examinations worth 100 marks. This evaluation system operates as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theoretical Subjects		50	Semester End	50
Daily attendance (Regularity and Punctuality)	10%			
Assignments	20%			
Discipline (Dress, Behavior, outlooks)	10%			
VIVA and Class Performance	10%			
Presentation skill	10%			

Internal Examination	40%			
Practical Subjects		50		
Daily attendance (Regularity and Punctuality)	10%			
Assignments	10%			
Discipline (Dress, Behavior, outlooks)	5%			
VIVA and Class Performance	10%			
Presentation skill	5%			
Internal Examination	40%			
Practical Exam/Project Work	20%			
Full Marks: 50 + 50 = 100				

8. Students' Responsibilities

To be eligible for the Semester End Examinations, students must achieve a minimum of 45% marks in internal evaluation including both theoretical and practical section. Additionally, they must maintain an attendance of at least 80% in their classes. Failure to meet these criteria will result in a "NOT QUALIFIED" (NQ) status, rendering the student ineligible for the Semester End Examinations. Students are strongly advised to attend all classes, formal exams, tests, and fulfill all requirements within the stipulated time frame. It is essential for students to fulfill all course requirements to successfully complete the course.

Pokhara University
Faculty of Science and Technology

Course Code	: CMP 117	Full Marks	: 100
Course Title	: Programming Logic and Techniques (3-3-0)	Pass Marks	: 45
Nature of the Course	: Theory/Conceptual	Total Lecture Hours	: 48
Level	: Bachelor	Program	: BCA

1. Course Description

This course is most popular conceptual course to bachelor level of students for develops their career in programming filed. The main theme of this course is that the students without concept of programming, the concept of programming is only possible with logical creation of the system and the concept only to be implicated with proper technique and tools. Students are able to learn programming concept with languages in the first unit and concept can be applied in the program development. The third unit provides the logical and technical ideas, knowledge and tools for better programming where the fourth unit focuses to develop an error free program or software with maintaining budget, time and environment. Finally, the fifth unit familiarizes students about standalone, client-server programming, web programming and mobile computing.

2. Course Objectives

This course is designed with the following general objectives:

- To familiarize the students with the concept of fundamental problem analysis, modeling and coding techniques.
- To develop the skill about program, programing and various programming languages.
- To promote the knowledge about the phases of program development and its methodologies.
- To acquaint the student with create and innovate the ideas, skills using specific tools and techniques.
- To make the student able to develop a plan and procedure for a standardized program with minimizing errors and budget.
- To provide the concept about programming in client server, web server and mobile, cloud.

3. Methods of Instruction

The medium of instruction is English and the faculty members can apply the various tools and techniques for teaching methodologies. As per the student's ability faculties have their rights to use the teaching methodologies like Class Room/Lecture-based, Discussion-based, Project-based learning(PBL), Problem-based Learning (PBL), Flipped Classroom-based, Active Learning, Socratic Method, Cooperative Learning, Experimental Learning, Gamification, Inquiry-based Learning, Constructivist Approach, Collaborative Learning, Direct Instruction, Differentiated Instruction, Montessori Method, Reggio Emilia Approach, Waldorf Education, Peer Teaching etc. are called alternative method of teaching to motivate the students for learning. After completion of each unit, faculty members can evaluate the students theoretically and practically if exists. They can conduct VIVA, Supersized test, Questionnaire test, Assignment test, Project work and Practical work, even Terminal examination as per the requirement.

4. Course Contents in Details

Specific Unit wise Objective	Course Contents
Unit 1: Programming Languages	14 hours

<ol style="list-style-type: none"> 1) Describe the computer languages, generation and their types with their features 2) Explain the program translation processes from a source program to object/executable file. 3) Interrupt the loading, linking and relocating the program into the memory while compilation. 	<ol style="list-style-type: none"> 1.1 Introduction 1.2 Analogy with Natural Language 1.3 Classification of Computer Language (Low Level Language and High Level Language) <ol style="list-style-type: none"> 1.3.1 Low Level Languages, (Machine and Assembly Language) 1.3.2 Advantages and Disadvantages of Machine Level Language 1.3.3 Advantages of Assembly Language over machine Level 1.3.4 Disadvantages of Assembly Language 1.4 High Level Language <ol style="list-style-type: none"> 1.4.1 Advantages and Limitations of High Level Language 1.4.2 Difference between Low Level and High Level Language 1.4.3 Program Language Translator <ol style="list-style-type: none"> 1.4.3.1 Types of Translator (Compiler, Assembler and 1.4.3.2 Different among Translator 1.5 Linker and Loader <ol style="list-style-type: none"> 1.5.1 Types of Linder and Loader 1.6 Generation of Computer Languages <ol style="list-style-type: none"> 1.6.1 Introduction to 3GL and 4GL 1.6.2 Advantages of 4GL over 3GL 1.6.3 Feature of 4GL (Object Oriented Language) 1.7 Machines Independent and Portability of programs 1.8 Important types of High-Level Language
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Unit 2: Program/ Software Development		10 hours
<ol style="list-style-type: none"> 1) Describe the program development step and role of life cycle. 2) Explain the role of budget in a program development 3) Identify the role of programming tools for the good programming 4) Explain the role of creative, logical and analytical thoughts for requirement study and efficient program development 	<ol style="list-style-type: none"> 2.1 Introduction to program development/software development 2.2 Program Development Life Cycle. <ol style="list-style-type: none"> 2.2.1 Problem identification 2.2.2 Problem Analysis/Requirement Analysis 2.2.3 Program Design Phases (Data design, Input, Output, Procedure, File design) 2.2.4 Program coding 2.2.5 Program Testing and Debugging 2.2.6 Program Delivery/Implementation and Evaluation 2.2.7 Program Maintenance 2.2.8 Documentation 2.3 Basic Programming Tools <ol style="list-style-type: none"> 2.3.1 Algorithm 2.3.2 Flowchart 2.3.3 Decision Table 2.3.4 Pseudocode 2.4 Comparison of Programming Tools 2.5 Advantages and Disadvantage of Programming Tools 2.6 Example of Programming Tools 	
Unit 3: Programming Techniques		8 hours

<ol style="list-style-type: none"> 1) Describe programming techniques and models 2) Compare programming techniques and model for easily identify the advantages and disadvantages 3) Compare cohesion and coupling with their types 4) Explain the internal relationship of modules for communication in programming. 	<ol style="list-style-type: none"> 3.1 Introduction 3.2 Type of Programming Technique (Approaches) <ol style="list-style-type: none"> 3.2.1 Modular, Top down, bottom up, Structure and Object Oriented approach 3.2.2 Advantages and Disadvantages 3.3 Program Development Methods (Models) <ol style="list-style-type: none"> 3.3.1 Types of Program Development Models (Water fall or Traditional model, Prototype or Transformation model, Spiral model, Iterative model, V-model, RAD model, Bog Bang model, Evolutionary models, Agile) 3.3.2 Advantage and Disadvantages of Waterfall, Prototype and Spiral Model (Simple Introduction to other Models) 3.4 Cohesion and coupling <ol style="list-style-type: none"> 3.4.1 Types of Cohesion and Coupling 3.4.2 Use of Cohesion and Coupling in Program Development 3.5 Logics o Program Development <ol style="list-style-type: none"> 3.5.1 Types of Logics (Sequential, Selection Iteration and Recursion) 3.5.2 Differentiation 3.6 Communication between modules
Unit 4: Program Maintenance 8 hours	
<ol style="list-style-type: none"> 1) Describe the software maintenance, its cost issues and time factors 2) Compare the ratio of the budget for development and maintenance of the programme. 3) Describe the role of program documentation and its standard 4) Explain the role of system flow and DFD in program design 5) Describe the requirement specification of the program and development procedures 	<ol style="list-style-type: none"> 4.1 Introduction 4.2 Types of Program maintenance (Corrective maintenance, Adoptive maintenance, Perfective maintenance, Emergency maintenance) 4.3 Problem Areas in Program Maintenance 4.4 Cost issues in software maintenance 4.5 Impact of software Errors 4.6 Program documentation and its standards <ol style="list-style-type: none"> 4.6.1 Requirements of Documentation 4.6.2 Importance of Documentation 4.6.3 Types of Documentation 4.7 Program Specification 4.8 System Flow Chart <ol style="list-style-type: none"> 4.8.1 Elements of System Flowcharts 4.8.2 Examples of System Flowchart 4.9 Data Flow Diagram <ol style="list-style-type: none"> 4.9.1 Element of DFD 4.9.2 Leveling the data flow diagram 4.9.3 Idea for Drawing DFD 4.9.4 Examples of DFD
Unit 5: Client Server and Web-based Programming Technology 8 hours	

<p>1) Explain computer and communication, stand-alone and client server computing, two and three-tier architecture of client server system, web-based programming</p> <p>2) Describe the role of platform independent feature of software</p>	<p>5.1 Standalone Programming concept 5.1.1 Introduction 5.1.1 Advantage and limitations of Standalone Programming</p> <p>5.2 Client Server Programming (CSP) 5.2.1 Introduction to Client server programming 5.2.2 Advantages and Disadvantages of CSP 5.2.3 Distinguish between Standalone and Client Server Programming 5.2.4 Client Server Programming Architecture 5.2.5 Some of the client server programming and their applications</p> <p>5.5 Web-based Programming 5.5.1 Introduction to web, versions of web 5.5.2 Advantages and Disadvantages of web-based programs 5.5.3 Architecture of web-based programming 5.5.4 Web-based System and Programming 5.5.5 Some important web-based programming and their applications</p> <p>5.6 Introduction to mobile computing languages and their application 5.7 Requirement of Platform-Independents system</p>
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5. Prescribed Books and References

Text Books

1. P.K. and Priti Sinha, *Foundations of Computing*, BPB Publications, Third Edition

References Books

1. Er. Hari Bhandari, *A Text Book of Programming Logics and techniques*, OCEM Publication, Second Edition
2. V.K Jain, *Computer Fundamentals*, BPB Publications

7. Evaluation System

Student academic performance is assessed through internal and external methods. Internal evaluation is carried out by faculty members, monitoring day-to-day student progress. On the other hand, external evaluation is conducted by the university, involving semester-end examinations worth 100 marks. This evaluation system operates as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theoretical Subjects		50	Semester End	50
Daily attendance (Regularity and Punctuality)	10%			
Assignments	20%			
Discipline (Dress, Behavior, outlooks)	10%			
VIVA and Class Performance	10%			
Presentation skill	10%			
Internal Examination	40%			

8. Students' Responsibilities

To be eligible for the Semester End Examinations, students must achieve a minimum of 45% marks in internal evaluation including both theoretical and practical section. Additionally, they must maintain an attendance of at least 80% in their classes. Failure to meet these criteria will result in a "NOT QUALIFIED" (NQ) status, rendering the student ineligible for the Semester End Examinations. Students are strongly advised to attend all classes, formal exams, tests, and fulfill all requirements within the stipulated time frame. It is essential for students to fulfill all course requirements to successfully complete the course.

Pokhara University
Faculty of Science and Technology

Course Code: CMP 111 (1 Credit)
Course title: Computer Application Workshop (1-0-3)
Nature of the course: Practical
Year: First
Level: Bachelor

Full marks: 100
Pass marks: 45
Time per period: 1 hour
Total periods: 48
Program: BCA

1. Course Description

This course provides the knowledge and hands-on skills of computer hardware, software, computer networking and enables students to identify and rectify the onboard computer hardware, software and network related problems. Students will be able to understand the hardware specifications for the operating system and various application programs.

General Objectives

The general objectives of this course are:

- To familiarize the students with the computer systems hardware, basic practical works and computer networking concepts
- To make the students competent in install/update operating system and various application software, manage data backup and restore operations on a computer system

2. Methods of Instruction

Specific instructional techniques: Lab works, Project works

3. Contents in Detail

Specific Objectives	Contents
- Recognize the computer hardware and accessories.	Unit 1: Introduction to Desktop/Workstation Assembly (6) 1.1 Demonstration of computer hardware and peripheral devices: Processors, Motherboard, Memory, Storage devices, I/O Devices. 1.2 Demonstration of Power Supply-SMPS, Internal cabling and Ports.
- Assemble and Disassemble PC and laptop with power supply, internal cabling, Motherboard and PCI Device	Unit 2: Assembling Desktop and Laptop Computer (6) 2.1 Assembling steps and precautions. 2.2 Setting of motherboards, memory, hard disk, processors, CDROM, SMPS and other devices.
- Install OS (Linux and Windows) in Desktop/Laptop	Unit 3: Laptop/Desktop OS Installation (8) 3.1 BIOS setting, firmware types, BOOT configuration. 3.2 Hard disc partitioning.

	3.3 OS installation (Linux, Windows). 3.4 User account management 3.5 Printer, Scanner installation/Sharing.
- Install and update application software and utility software. - Scan and remove viruses from computer system.	Unit 4: Software Installation (8) 4.1 Installation of application and utility software. 4.2 Update of firmware patches, 4.3 Anti-virus installation and scanning.
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- Recognize computer networks-wired PAN, CAN, LAN and Wireless LAN configuration.	Unit 5: Networking and Internet Setup (6) 5.1 Introduction to Computer Network, Network topologies, wired and wireless networking media. 5.2 Network cabling, cable types and connectors. 5.3 IP Address setting., Sharing of Printer/Device 5.4 Basic wireless AP configuration.
- Study of server of Mail/Data/Domain/FTP. - Apply FTP/SCP Client tool to upload/download files to FTP server.	Unit 6: Server Installation and Backup (6) 6.1 Introduction to server. 6.2 Study of different server (Email, Data, Domain, FTP).
- Use the basic troubleshooting tools and utilities.	Unit 7: Hardware and Software Troubleshooting (8) 7.1 Basic Repair and Maintenance of Desktop/Laptop. 7.2 Replacement of Passive Components. 7.3 Uses of basic software troubleshooting commands. 7.4 Uses of trouble shooting tools and utilities.

4. Evaluation system and Students' Responsibilities

Evaluation System

The evaluation of a student may consist of assignments, attendance, test-exams, term-exams, lab reports and projects etc. The tabular presentation of the evaluation is as follows:

External Evaluation	Marks	Internal Evaluation	Weight	Marks
Semester-End examination	0	Attendance & Class Participation	5%	100
		Assignments/Lab Report	10%	
		Quizzes/MCQ	10%	
		Project Work/	10%	
		Viva	15%	

		Internal Exam	50%	
	0	Total Internal		100
Full Marks: 0 + 100 = 100				

Student Responsibilities

Each student must secure at least 45% marks in internal evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) and the student will not be eligible to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

5. Prescribed Books and References

References

1. Rosch, W. R. *The Winn L. Rosch Hardware Bible*. USA: Sams.
2. Bose, A. K. *Hardware and Software of Personal Computers*. New Delhi: New Age International.
3. Rajaraman, V. and Adabala, N. *Fundamental of Computers*. New Delhi: PHI Learning.

Pokhara University Faculty of Science and Technology	
Course Code: ENG 122 (3 Credits)	Full Marks: 100
Course Title: Business and Technical Communication (3-3-1)	Pass Mark: 45
Nature of the Course: Theory and Practical	Total Lectures: 48 hours
Level: Bachelor/ Year: I Semester: II	Program: BCA

1. Course Description:

This course is designed for the foundations of communication through writing letters, memos, emails, preparing reports and proposals, seminar papers, structuring of essay and verbal and nonverbal communications. The course includes a practicum component in that students towards the end of the semester to submit a portfolio that includes a range of writing assignments such as technical correspondence and job application process. This course follows various teaching and learning methodologies specially, the seminar model of classroom teaching with discussions and presentations using modern tools and techniques. And it offers conceptual insight into the field, principles of communication design, style, grammar and various writing skills of general and academic interests.

2. General Objectives:

The general objectives of this course are as follows:

- a. To be able to comprehend and take notes after listening.
- b. To develop the ability to deliver technical knowledge orally in English.
- c. To fasten reading skills in technical and non-technical reading materials
- d. To be able to write proposals, reports, letters, description on technical talks.

3. Methods of Instructions:

- Lecture and discussion
- Demonstration
- Presentation
- Explanation and illustration
- Group and individual work
- Project work
- Self-study etc.

It is expected that students are fully engaged with the teacher in subject matters and lessons to excel their interactive and presentation skills.

4. Course Content in details

Specific Objectives	Course Content
	Unit 1: Introduction to Communication (3 hrs)
<ul style="list-style-type: none"> • Explain the communication and its processes • Describe the principles 	<ul style="list-style-type: none"> • Definition of communication • Process of Communication • 7 C's Principles of communication

of communication	
	Unit 2: Technical communication Process (8hrs)
<ul style="list-style-type: none"> Define technical communication with its forms and types Explain the role competency and contrast with its core competencies along with attitudes, values and personality. Describe the skill sets for technical writers 	<ul style="list-style-type: none"> Definition Evolution of technical communication Forms of technical communication Types of technical communication Importance of technical communication Definition of Competency Attitudes, values and personality Core competencies in technical communication Skill sets for technical writers
	Unit 3: Technical communication process (5 hrs)
<ul style="list-style-type: none"> Describing the technical communication process at two different levels- document and collaboration processes. 	<ul style="list-style-type: none"> The Document Process: - <ul style="list-style-type: none"> Planning Writing the draft, Revising Delivery The Collaboration Process <ul style="list-style-type: none"> The pros and cons of collaboration Collaborative writing process Strategies for effective collaborative writing
	Unit 4: Correspondence (8 hrs)
<ul style="list-style-type: none"> Comparing the techniques of writing letters to apply for job Describe the role of correspondence in the form of memoranda and letters 	<p>Correspondence</p> <ul style="list-style-type: none"> Memo writing <ul style="list-style-type: none"> Meaning and definition of memo writing Purpose of memos Format of memo Letter Writing <ul style="list-style-type: none"> Introduction Features of letter Types of letters Job application- CV Letter of inquiry Quotation letter Order Letter Claim Letter Adjustment Letter
	Unit 5: Interviews, Meetings and Minutes (7 hrs)

<ul style="list-style-type: none"> • Highlight the nature and methods of effective job interviews, meeting and minutes 	<p>Interview:</p> <ul style="list-style-type: none"> • Introduction • Effective techniques for interview • Interview and body language <p>Meeting:</p> <ul style="list-style-type: none"> • Introduction • Purposes of Meeting • Notice (format of Meeting) • Minutes of Meeting • Purpose of Minutes • Format of Minutes
	<p>Unit 6: Technical Talk and Non-verbal Communication (3 hrs)</p>
<ul style="list-style-type: none"> • Explain the methods to develop the presentation skill and strategies • Describe the non-verbal communication and its forms 	<ul style="list-style-type: none"> • Oral communication • Oral presentation • Types of non-verbal communication • Importance of non-verbal communication • Characteristics of effective presentation
	<p>Unit 7: Writing Proposals and Reports (8 hrs)</p>
<ul style="list-style-type: none"> • Explain effective and efficient methods for writing the reports and proposals 	<p>Proposal writing</p> <ul style="list-style-type: none"> • Introduction • Components of proposals: Title, Introduction, Statement of Problem, Literature Review, Methodology, Budgeting, Output • Types of proposal <p>Report Writing</p> <ul style="list-style-type: none"> • Introduction • Different types of Report • Elements of Report :Title, Acknowledgement, Abstract, Introduction, Methodology, Results/Findings, Conclusion and recommendation, References
	<p>Unit 8: Real-Life Scenarios and Role-Playing (3 hrs)</p>
<ul style="list-style-type: none"> • Enhance the quality of life job interviews • Explain how to resolve 	<ul style="list-style-type: none"> • Mock job interviews • Negotiating contracts and agreements • Resolving IT-related conflicts

IT related conflicts involving group discussions	<ul style="list-style-type: none"> Group discussions on IT trends and innovations
Uni 9: Grammar and Usage (3 hrs)	
<ul style="list-style-type: none"> Describe grammatical items and transform the sentences as required. Explain the varieties of English with focus on usage 	<ul style="list-style-type: none"> Phrases, clauses and sentences Functional and structural division of sentences Transformation of sentences Voice- Active and Passive Varieties of English

Evaluation System

The internal evaluation of a student may consist of assignments, attendance, term-exams, lab reports and projects etc. The tabular presentation of the internal evaluation is as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theory			Semester End	50
Attendance & Class Participation	5			
Assignments	5			
Presentations/Quizzes	5			
Internal Assessment	25			
Practical Test	10			
Total Internal		50		
Full Marks: 50 + 50 = 100				

Students' Responsibilities

Each student must secure at least 45% marks separately in internal assessment and practical evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

8. Prescribed Books and References

References:

1. Technical Communication Adhikari, Dharma, and Upadhyaya, Phanindra, Buddha Publication
2. Swan, M. (2005). *Practical English Usage* (Vol. 688). Oxford: Oxford university press.
3. Raman, M. and Sharma, Sangeeta, (2020). *Technical Communication Principles and Practice*.
4. Gardner, P., 2005. *New directions: Reading, writing, and critical thinking*. Cambridge University Press.

5. Awasthi, J.R., Bhattarai, G.R. and Rai, V.S., 2015. English for the new millennium.
6. Graves, H. and Graves, R., 2012. *A Strategic Guide to Technical Communication-(US)*. Broadview Press.

Pokhara University Faculty of Science and Technology	
Course Code: MTH 132 (3 Credits)	Full Marks: 100
Course Title: Mathematics II (3-3-0)	Pass Mark: 45
Nature of the Course: Theory and Practical	Total Lectures: 48 hours
Level: Bachelor/ Year: I/ Semester: II	Program: Bachelor in Computer Application

1. Course Description:
This course covers fundamental of integrals, application of integration, differential equations, vector Space, complex numbers and function of complex variables, sequence and series and Fourier series which are essential as mathematical foundation for computing.
2. General Objectives:
The general objective of this course, is to provide the students with basic mathematical skills required to understand Computer Application Courses
3. Methods of Instructions:
Lecture, Tutorial, Discussion, Assignments and Practical works.

4. Contents in Detail

Specific Objectives	Contents
Explain <ul style="list-style-type: none"> • Indefinite • Definite • Improper and • Double integration • Symbolic calculation of integration using any software tools (MATLAB/Mathematica/Octave etc.) 	Unit 1: Fundamental of integrals [10 Hrs] <ul style="list-style-type: none"> 1.1 Introduction 1.2 Indefinite integrals 1.3 Techniques of integration <ul style="list-style-type: none"> 1.3.1 Integration by substitution 1.3.2 Integration by parts 1.3.3 Integration by partial fractions 1.4 Definite integrals 1.5 Improper integrals 1.6 Beta and Gamma functions 1.7 Double integral (concept only)

<ul style="list-style-type: none"> Evaluate area and volume by integration 	<p>Unit 2: Application of integration [7Hrs]</p> <p>2.1 Introduction</p> <p>2.2 Application in economics (Determination of total cost and total revenue function)</p> <p>2.3 Area between the curves</p> <p>2.4 Arc length of curves</p> <p>2.5 Volume of solid of revolution (Disks and Washers)</p> <p>2.6 Area of surface of revolution,</p> <p>2.7 Consumer's surplus and producer's surplus</p>
<ul style="list-style-type: none"> Solve first and second order differential equations. 	<p>Unit 3: Differential equations [7 Hrs]</p> <p>3.1 Introduction</p> <p>3.2 Order and degree of ordinary differential equations.</p> <p>3.3 Solution of differential equations of first order by</p> <p>3.3.1 Separation of variables</p> <p>3.3.2 Homogeneous</p> <p>3.3.3 Linear</p> <p>3.3.4 Equation reducible to linear form (Bernoulli's equation)</p> <p>3.3.5 Linear and exact differential equations</p> <p>3.4 Second order homogenous ODE with constant coefficients.</p> <p>3.5 Second order Non homogenous ODE (Concept only)</p>
<ul style="list-style-type: none"> Solve the problem related to Vector spaces, subspaces, linear dependent and independent, and Eigen values and Eigen vectors 	<p>Unit 4: Vector Space [6 Hrs]</p> <p>4.1 Introduction</p> <p>4.2 Vector spaces and subspaces with example</p> <p>4.3 Linear combination of vectors</p> <p>4.4 Linear dependence and independence of vectors</p> <p>4.5 Basis and dimension of vector space</p>

	4.6 Eigen values and Eigen vectors.
<ul style="list-style-type: none"> Solve and analyze complex number related problems 	Unit 5: Complex numbers and Function of complex variables [7Hrs] 5.1 Introduction 5.2 Algebra of the complex numbers 5.3 Geometric representation of complex numbers 5.4 Conjugate and absolute values of complex numbers 5.5 Polar form of complex numbers 5.6 Complex variables and function of complex variables 5.7 Analytic functions 5.8 Necessary and sufficient conditions for $f(z)$ to be analytic (without proof) 5.9 Harmonic functions 5.10 Conformal mappings
<ul style="list-style-type: none"> Find Sum of series Expand function in series 	Unit 6: Sequence and series [6 Hrs] 6.1 Introduction 6.2 Arithmetic and Geometric series 6.3 Sum of finite natural numbers 6.4 Sum of square of first 'n' natural numbers 6.5 Sum of cubes of first 'n' natural numbers. 6.6 Convergence of geometric series 6.7 Taylor series (one and two variables) 6.8 Maclaurin series.
Find Fourier series, Fourier sine and cosine series	Unit 7: Fourier series [5 Hrs] 7.1 Introduction 7.2 Periodic functions and trigonometric series 7.3 Fourier series 7.4 Fourier sine and cosine series

5. List of Tutorials.	
SN	
1.	Problems of indefinite, definite and improper integration.

2.	Area, volume, Consumer's surplus and producer's surplus.
3.	Solution of first and second order differential equations.
4	Problem related to Vector spaces ,subspaces, linear dependent and independent, and Eigen values and Eigen vectors.
5	Solve complex numbers & complex function related problems
6	Sum of series and expansion of function in series
7	Fourier series, Fourier sine and cosine series

6. List of Practical's by using MATLAB/Mathematica /other software tools	
SN	
1.	Integration by symbolic calculations
2.	Visualization of figure for surface area and volume.

5. Evaluation System and Students' Responsibilities

Evaluation System

The internal evaluation of a student may consist of assignments, attendance, term-exams, lab reports and projects etc. The tabular presentation of the internal evaluation is as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theory		50	Semester End	50
Attendance & Class Participation	10%			
Assignments	20%			
Presentations/Quizzes	10%			
Internal Assessment	60%			
Total Internal		50		
Full Marks: 50 + 50 = 100				

Students' Responsibilities

Each student must secure at least 45% marks separately in internal assessment and practical evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

8. Prescribed Books and References

Text Books:

1. Erwin Kreyszig *Advance engineering Mathematics*,
2. Thomas and Finney *Calculus* Pearson

References:

1. D.R. Bajracharya, R.M. Shrestha & 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. K.K. Shrestha & R. K. Thagurathi, Applied Mathematics
4. Rudra Pratap *Getting Started with MATLAB*, Oxford University Press 2010

Pokhara University
Faculty of Science and Technology

Course Code: ACC 131 (3 Credit)	Full Marks: 100
Course Title: Financial Accounting (3-3-1)	Pass Mark: 45
Nature of the Course: Theory and Practice	Total Lectures: 48 hours
Level: Bachelor/ Year: I/ Semester: II	Program: Bachelor in Computer Application

1. Course Description:

This course aims to explore the fundamental principles and practices of Financial Accounting. This comprehensive course covers the entire accounting cycle, including inventory management and bank reconciliation statements. In this course, students will learn in-depth about journals, ledgers, and trial balances; the accounting equation; income statements, statements of retained earnings, and balance sheets; cash flow statements; inventory management; and bank reconciliation statements. By the end of this course, students will have a strong grasp of financial accounting concepts and will be well-equipped to analyze financial statements, make informed business decisions, and pursue further studies in accounting or related fields. Whether students aspire to become accountants, entrepreneurs, or simply have an interest in financial literacy and software development, this course will provide them with valuable skills for the business world. In summary, this course provides students with a solid foundation in the aspects of financial reporting and analysis.

2. General Objectives:

Studying Financial Accounting typically involves several general objectives that help students gain a comprehensive understanding of financial reporting and analysis. This course is designed with the following general objectives:

- To make students able to understand financial transactions.
- To enable the students to prepare and interpret key financial statement.
- To make students familiar with accounting standards such as GAAP, IFRS, NAS and so on.
- To acquaint the students with the various types of activities conducted in an organization.
- To familiarize the students with the conceptual foundation of accounting.
- To acquaint the students with basics of corporate reporting.
- To enable students to process and record business transactions.
- To make students understand the use of computer in the field of financial accounting.

3. Methods of Instructions:

3.1. General Instructions:

- Lecture
- Group discussion
- Question-answers
- Home Assignment and Self Study
- Classroom Presentation
- Problem Solving

3.2. Specific Instruction:

After completing each unit, students must present their views and opinions related to the taught subject matters.

4. Course Contents in Details	
Specific Objectives	Contents
Explain the accounting principles and theories.	Unit I: The Conceptual Foundation of Accounting (7 Hours)
	1.1 Accounting as a Language of Business 1.2 Forms of Business Organizations 1.3 Types of Activities Performed by Business Organizations 1.4 Users of Accounting Information: Internal and External 1.5 Qualitative Characteristics of Accounting Information 1.6 The Accounting Profession – Role and Activities of an Accountant 1.7 The Accounting Framework – GAAP 1.8 Accounting Terminology 1.9 Accounting Information System in Modern Business Organizations 1.10 Use of Computers in Accounting Process
Describe the financial information clearly to stakeholders and ensure adherence to accounting standards and regulations.	Unit II: Basics of Corporate Reporting (5 Hours)
	2.1 Legal Requirement of Accounting: Provisions of Company Act Relating to Accounting 2.2 Introduction to Accounting Standards: IFRS and NAS 2.3 Annual Report 2.3.1 Definition 2.3.2 Major Components/Elements of Annual Report 2.4 Financial Statements 2.4.1 Definition 2.4.2 Objectives of Financial Statement (Primary & Secondary) 2.4.3 Components of Financial Statement 2.4.3.1 Income Statement 2.4.3.2 Statement of Retained Earnings 2.4.3.3 Balance Sheet 2.4.3.4 Statement of Cash Flow 2.4.3.5 Statement of Changes in Stockholders' Equity 2.5 Accounting Policies and Notes 2.6 Introduction to Audit 2.7 Legal Provisions Regarding Audit of Accounts in Nepal
Explain in precise systematic documentation of all financial activities within an organization.	Unit III: Processing and Recording Business Transactions (6 Hours)
	3.1 The Basic for Recording Transactions 3.1.1 Sources of Accounting Information 3.1.1.1 Types of Source Document 3.1.1.2 Role/ Importance of Source Documents 3.1.2 Recording of Transaction and Events 3.1.2.1. External Transactions (Events) 3.1.2.2 Internal Transactions (Events) 3.1.3 The Accounting Equation and Analysis of Transactions 3.1.3.1 Steps Involved in Developing Accounting Equation 3.2 The Double Entry System 3.2.1 The Account and its Analysis 3.2.2 Debits and Credits and its Rules 3.2.3 The Journals (General Journals and Compound Journals)

	<p>3.2.4 General Ledger (Standard Format and T-Account)</p> <p>3.2.5 Normal Account Balances</p> <p>3.2.6 Trial Balance (Meaning/ Objectives/ and Preparation)</p> <p>3.2.7 Use of Excel in Processing Business Transactions</p>
Describe an organization's profitability, health, financial performance, sources, and utilization of fund over a specific period through the income statement, balance sheet, and cash flow statement.	<p>Unit IV: Preparation of Financial Statement (15 Hours)</p> <p>4.1 Income Statement</p> <p>4.1.1 Concept of Income Statement</p> <p>4.1.2 Basic Concepts, Principles, and Conventions used in Income Statement</p> <p>4.1.3 Major Components of Income Statement</p> <p>4.1.4 Preparation of Income Statement (vertical multi-step format)</p> <p>4.1.5 Statement of Retained Earnings</p> <p>4.2 Balance Sheet</p> <p>4.2.1 Concept of Balance Sheet</p> <p>4.2.2 Basic Concept, Principles, and Conventions used in Balance Sheet</p> <p>4.2.3 Major Components of Balance Sheet</p> <p>4.2.4 Preparation of Balance Sheet</p> <p>4.2.5 Use of Computers in Preparation of Income Statement and Balance Sheet</p> <p>4.3 Cash Flow Statement</p> <p>4.3.1 Meaning of Cash Flow Statement</p> <p>4.3.2 Purpose of the Cash Flow Statement</p> <p>4.3.3 Importance of Cash Flow Statement</p> <p>4.3.4 Classification of Cash Flow Activities</p> <p>4.3.5 Preparation of Cash Flow Statement</p> <p>4.3.6 Two Methods of Reporting Cash Flow from Operating Activities</p> <p>4.3.7 Accruals and Cash Basis Accounting</p> <p>4.3.8 Reconciling Cash Flow under Operating Activity using Indirect Method</p> <p>4.3.9 Use of Computers in Preparation of Cash Flow Statement</p> <p>4.4. Financial Ratios based on Financial Statements</p> <p>4.4.1 Liquidity Ratios</p> <p>4.4.2 Leverage Financial Ratios</p> <p>4.4.3 Efficiency Ratios</p> <p>4.4.4 Profitability Ratios</p>
	<p>Unit V: Accounting for Cash and Cash Equivalent (6 Hours)</p> <p>5.1. Components of Cash and Cash Equivalent</p> <p>5.2 Need for Adjustment to Accounting Records</p> <p>5.3 Preparation of the Bank Reconciliation Statement</p> <p>5.4 Petty Cash</p> <p>5.5 Balance Sheet Presentation of Cash and Cash Equivalent</p> <p>5.6 Internal Control System</p> <p>5.7 Cash Control (Receipt and Disbursement)</p>
	<p>Unit VI: Inventories and Cost of Goods Sold (9 Hours)</p>
Ccompare the inventory	6.1 Introduction to Inventory

management techniques and its impacts on profitability and operational efficiency of the organization.	6.2 Meaning and Nature of Inventory 6.3 Determining Inventory Quantities 6.4 Cost Included in Inventory 6.5 Cost of Goods Sold Models 6.6 Inventory System: Periodic and Perpetual 6.7 Inventory Costing Methods with Periodic System 6.8 Inventory Costing Methods with Perpetual System 6.9 The Choice of Inventory Method 6.10 Inventory Valuation and Income Measurement 6.11 Disclosure in the Financial Statement 6.12 Accounting Principles Related to Inventory 6.13 Methods of Inventory Estimation 6.14 Analysis of Inventory
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5. List of Tutorials	
SN	Identifying financial issues, which are against GAAP, IFRS, and NAS.
1.	Searching annual report of any organizations and analyzing overall contents of the report.
2.	Collecting source documents and analyzing how an organization records transaction based on source documents.
3.	Preparing journals, ledgers, and trial balance from different types of economic transactions.
4.	Preparing income statement, statement of retained earnings, and balance sheet.
5.	Preparing cash flow statement.
6.	Solving different types of problems related to financial ratios and interpreting them.
5.	Evaluating inventory using different methods under periodic and perpetual system.
6.	Solving different issues related to bank reconciliation statement.

6. List of Practical	
SN	
1.	Preparing income statement, balance sheet, and cash flow statement using accounting software.
2.	Prepare and present a case study on accounting software used by any public or private organization.

5. Evaluation System and Students' Responsibilities

Evaluation System

The internal evaluation of a student may consist of assignments, attendance, term-exams, lab reports and projects etc. The tabular presentation of the internal evaluation is as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theory		30	Semester End	50
Attendance & Class Participation	10%			
Assignments	20%			

Presentations/Quizzes	10%		
Internal Assessment	60%		
Practical		20	
Attendance & Class Participation	10%		
Lab Report/Project Report	20%		
Practical Exam/Project Work	40%		
Viva	30%		
Total Internal		50	
Full Marks: 50 + 50 = 100			

Students' Responsibilities

Each student must secure at least 45% marks separately in internal assessment and practical evaluation with 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

8. Prescribed Books and References

Text Books:

1. Porter, G.A., & Norton, C.L. *Financial Accounting: The Impact on Decision Makers*. USA: The Dryden Press

References:

- Hermanson, H.R. and Edwards, D.J. *Financial Accounting: A Business Perspective*. USA: Von Hoffmann Press.
- Kimmel, P.D., Weygandt, J.J., & Kieso, D.E. *Financial Accounting*. New Delhi: Wiley India Pvt. Ltd.
- Narayanswamy, R. *Financial Accounting: A Managerial Perspective*. New Delhi: Prentice Hall of India.
- Koirala, M.P., Acharya, C., Sharma, L.P.B., Sharma, N., & Gautam, C.M. *Financial Accounting*. Kathmandu: Buddha Academic Enterprises.
- Nepal Accounting Standard (NASs).
- International Accounting Standards (IASs) / International Financial Reporting Standards (IFRSs).

Pokhara University
Faculty of Science and Technology

Course Code	: CMP 118 (3 Credits)	Full Marks	: 100
Course Title	: Programming in C (3-3-3)	Pass Marks	: 45
Nature of the Course	: Theory/Practical	Total Lecture Hours	: 48
Level	: Bachelor	Program	: BCA

1. Course Description

This course is designed to encompass the concepts of the C programming through a combination of theory and practical components. This course covers syntax, data types, control structures, functions, arrays, pointers, file handling, and dynamic memory allocation. The course aims to equip students with the skills necessary to write efficient and error-free C programs and apply their knowledge to real-world programming challenges.

By the end of this course, you will be able to write efficient and error-free C programs, understand the underlying principles of the language, and apply your knowledge to solve real-world programming challenges. Whether you aspire to pursue a career in software development, systems programming, or any other field that requires C programming skills, this course will lay a solid foundation for your future endeavors.

2. General Objectives

- To provide the comprehensive understanding of the programming language.
- To introduce the develop proficiency in writing structured and error-free programs.
- To utilize different data types and control structures effectively in programming.
- To gain hands-on experience with arrays, pointers, and file handling in C.
- To enhance programming skills through a series of practical exercises and assignments, encouraging the application of learned concepts in real-world scenarios.
- To develop the ability to critically analyze and solve practical programming problems using the programming language, fostering a strong foundation for future programming endeavors.

3. Methods of Instruction

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Lecturer method need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
- Use of Video/Slides/Animations to explain functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask atleast three HOT(Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning, which fosters student's Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
- Introduce Topics in manifold representations.
- Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
- Discuss how every concept can be applied to the real world-and when that's possible, it helps to improve the students' understanding.
- Use visualization tool (for Eg. <https://pythontutor.com/visualize.htm>) in order to visualize the operations of C Programs

4. Course Contents in Details

Specific Unit wise Objective	Course Contents
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Unit-1 Introduction to C Programming		3 hours
<ul style="list-style-type: none"> ▪ Review about algorithm and flowchart. ▪ Describe history and features of C ▪ Explain the basic construct of structured programming 	<ul style="list-style-type: none"> 1.1 Review of Flowchart and Algorithms 1.2 History of C programming language 1.3 Features of C programming language 1.4 Structure of a C program 1.5 Preprocessor directives 	
Unit-2 Variables, Operators, and Datatypes		7 hours
<ul style="list-style-type: none"> ▪ Explain the basic constructs of C language 	<ul style="list-style-type: none"> 2.1 C character set, Tokens, 2.2 Keywords and reserved words 2.3 Identifiers with naming convention. 2.4 Constants and Variables <ul style="list-style-type: none"> 2.4.1 Introduction to Constants and Variables 2.4.2 Variable Declaration 2.4.3 Variable types 2.5 Datatypes 2.6 Operator <ul style="list-style-type: none"> 2.6.1 Types 2.6.2 Precedence and associativity of operators 2.7 Formatted and Unformatted I/O functions 2.8 Comments- Single line and Block 	
Unit-3 Control Statements		8 hours
<ul style="list-style-type: none"> ▪ Describing the role of control statement with its types 	<ul style="list-style-type: none"> 3.1 Clean code practices 3.2 Sequential control Statement 3.3 Selection Control Statement <ul style="list-style-type: none"> 3.3.1 Decision-making with if-else statements (if, if-else, else if) 3.3.2 Nested if 3.3.3 Conditional Operator 3.3.4 Switch statement for multi-choice decisions 3.4 Iteration control Statement <ul style="list-style-type: none"> 3.4.1 Looping with for, while and do-while loops 3.4.2 Nested Loop 3.5 Jump Statements 3.6 Best practices for writing structured code. 	
Unit-4 Arrays and Strings		10 hours
<ul style="list-style-type: none"> ▪ Describe the arrays and their declaration, accessing and manipulation in C ▪ Introduce the strings and string manipulation functions ▪ Explain the role of multi-dimensional arrays and its implementation 	<ul style="list-style-type: none"> 4.1 Introduction to arrays and their declaration 4.2 Accessing array elements and array indexing 4.3 Manipulating array elements 4.4 Multi-dimensional arrays 4.5 Working with strings and string manipulation functions 	
Unit-5 Functions		7 hours
<ul style="list-style-type: none"> ▪ Describing the basics of functions declaration, definition, calling and returning ▪ Compare the pass by value and pass by address ▪ Explain the role of recursion and pass arrays/strings to functions 	<ul style="list-style-type: none"> 5.1 Introduction to function <ul style="list-style-type: none"> 5.1.1 Types of function (Library and User defined) 5.2 Declaration, definition, and calling 5.3 Function arguments and return values 5.4 Function prototypes: 	

	5.4.1 No Arguments and No return values 5.4.2 Arguments but No return Values 5.4.3 Arguments with return values 5.4.4 No arguments but return a value 5.5 Recursive function. 5.6 Iteration versus recursion 5.7 Passing arrays and strings to functions
Unit-6 Structure and Union	4 hours
<ul style="list-style-type: none"> • Describe the user defined data types • Compare features and function of Structure and Unions • Introduce code modularity and maintainability, reusability and reduce complexity. 	6.1 Introduction to Structure and Union 6.2 Declaration, accessing members, initialization, size. 6.3 Nested structures 6.4 Arrays of structures 6.5 Passing structures to functions, returning structures. from functions. 6.6 Difference between structure and union
Unit-7 Pointers	3 hours
<ul style="list-style-type: none"> ▪ Describe the role of pointers with its operator. ▪ Introduce dereferencing and access memory location ▪ Explain the role of pointer arithmetic ▪ Compare the features and functions for dynamic memory allocation 	7.1 Introduction to pointers and pointer declaration 7.2 Dereferencing pointers and accessing memory locations. 7.3 Returning multiple values using pointers 7.4 Pointer arithmetic's 7.5 Pointers and arrays. 7.6 Pointers to structures 7.7 Pointer as a function argument 7.8 Dynamic Memory Allocation
Unit-8 File Handling	6 hours
<ul style="list-style-type: none"> ▪ Discuss the role of file and file file handling in C with its modes and functions 	8.1 Opening, reading, writing, and closing files using different techniques 8.2 Sequential and random access to files 8.3 Error handling and file input/output operations 8.4 File handling best practices

5. Laboratory and Assignments

The instructor should design laboratory and assignments by taking into consideration the necessary knowledge, technological aspects, practicality, and current trends related to the topic. The assignment guidelines should cater to the average students while also providing the opportunity to engage and challenge the more advanced ones. It is advisable for the instructor to create multiple sets of assignments and distribute them among different groups of students. It is also preferable that the assignments are based on real-world problems or applications. Students should be encouraged to utilize Hungarian notation, practice proper indentation, and include comments in their code.

Furthermore, the instructor can assign a mini-project that showcases the application of the learned concepts in a real-life scenario. Additionally, they may assign an assignment or mini-project that aligns with the respective branch of study, going beyond the syllabus.

Reference Books:

1. S.K. Srivastava and Deepali Srivastava: C in Depth
2. Kely and Pohl: A book on C
3. Wait, Mitchell, Steven Prata and Donald Martin: C primer Plus
4. Yeswant Kanetkar: Let us C

7. Evaluation System

Student academic performance is assessed through internal and external methods. Internal evaluation is carried out by faculty members, monitoring day-to-day student progress. On the other hand, external evaluation is conducted by the university, involving semester-end examinations worth 100 marks. This evaluation system operates as follows:

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Practical Subjects		50	Semester End	50
Daily attendance (Regularity and Punctuality)	10%			
Assignments	15%			
Discipline (Dress, Behavior, outlooks)	5%			
VIVA and Class Performance	5%			
Presentation skill	5%			
Internal Examination	40%			
Practical Exam/Project Work	20%			
Full Marks: 50 + 50 = 100				

8. Students' Responsibilities

To be eligible for the Semester End Examinations, students must achieve a minimum of 45% marks in internal evaluation including both theoretical and practical section. Additionally, they must maintain an attendance of at least 80% in their classes. Failure to meet these criteria will result in a "NOT QUALIFIED" (NQ) status, rendering the student ineligible for the Semester End Examinations. Students are strongly advised to attend all classes, formal exams, tests, and fulfill all requirements within the stipulated time frame. It is essential for students to fulfill all course requirements to successfully complete the course.

Course Code: ELX 112(3 Credits)
Course Title: Microprocessor and Computer Architecture (3-3-1)
Nature of Course: Theory and Practical
Level: Bachelor

Full Marks: 100
Pass Marks: 45
Total Lectures: 48 Hrs
Program: BCA

1. Course Description

This course is designed to encompass the fundamental concepts of 8085 and 8086 with assembly level programming. It also provides major notions for the design of processing unit, control unit architectures. It presents the various computer arithmetic algorithms to solve the computer arithmetic problems. This course also introduces memory and input/output organization and the advance computer architecture. After completion of this course, students can design very simple CPU and Control Unit.

2. General Objectives

The major objectives of this course are to provide knowledge of:

- To acquaint the students with basic concepts of basic architecture details of microprocessor (8085/8086)
- To acquaint the students with concepts of assembly level programming using 8-bit microprocessor
- To acquaint the students with the fundamentals of computer systems.
- To acquaint the students with the knowledge of computer architecture and associated processing, control unit and ALU unit of very simple central processing unit.
- To apprise the students with the architectural and associated components of computer systems.
- To aware the students about the architecture of the computer systems available in the market.

3. Methods of instructions

Lecture, Project work and Practical

4. Content in details

Specific objectives	Contents
<ul style="list-style-type: none"> • Familiarize with fundamentals of microprocessor-based system along with their real-world applications. 	<p>Unit 1 An overview of computer and Microprocessor [3 Hrs]</p> <p>1.1. Brief overview of microprocessor and microcontroller 1.2. Organization of computer systems 1.3. Architecture of computer 1.4. Applications of microprocessor and microcontroller</p>
<ul style="list-style-type: none"> • Describe the architecture of 8085 microprocessor and basic assembly level programming. • Explain the machine cycles involved during the execution of instructions. 	<p>UNIT 2 Architectural and assembly language programming of 8085 [12 Hrs.]</p> <p>2.1 Pin Configuration, 2.2 Functional Block Diagram 2.3.1 Timing and Control Unit, 2.3.2 Registers, 2.3.3 Data and Address Bus, 2.3.4 ALU 2.3.5 I/O Interface 2.3 Intel 8085 instructions types 2.3.1 Data transfer instructions</p>

	<p>2.3.2 Arithmetic instructions 2.3.3 Logic instructions 2.3.4 Decision and Branching instructions 2.3.5 Machine control instruction 2.4 Operation Code and Operands, 2.5 Addressing Modes, 2.6 Interrupts and Flags 2.7 Instructions Types and Data Flow inside 8085, 2.8 Timing Diagram (two examples of 4, 7, 10 and 13 T-states) 2.8 Basic Assembly Language Programming Using 8085 Instruction Sets</p>
<ul style="list-style-type: none"> Familiarize with the architecture of 16 bit microprocessor 8086. concept of memory segmentation and pipelining in modern processor. 	<p>UNIT 3 Overview of 8086 microprocessor 5 Hrs.] 3.1 Features of 8086 microprocessor 3.2 Functional diagram of 8086 microprocessor 3.3 Registers and Flags 3.4 ALP Development Tools: Editor, Assembler and linker</p>
<ul style="list-style-type: none"> Familiarize with CPU Fundamental 	<p>UNIT 4 CPU Fundamental 4 Hrs.] 4.1 CPU organization/Structure 4.2 Register organization and data path 4.3 Arithmetic and Logic units 4.4 Design principal for modern system</p>
<ul style="list-style-type: none"> Examine the basic structure of a micro-sequencer and Hardwired Control Unit 	<p>UNIT 5 Control Unit Design [7 Hrs.] 5.1 Control of the processor 5.2 Hardwired Control Unit(Control unit inputs and logic) 5.3 Microprogramed control units(Micro instruction and its types) 5.4 Architecture of micro programmed control unit 5.5 Microinstruction sequencing and execution 5.6 Application of hardwired and micro programmed control units</p>
<ul style="list-style-type: none"> Understand the representation of binary numbers in signed and unsigned notation along with the algorithms used for the basic arithmetic operations. 	<p>UNIT 6 Computer Arithmetic [7 Hrs.] 6.1 Numeric format and representation of binary number in signed and unsigned notation 6.2 Addition and subtraction in signed and unsigned notation. 6.3 Shift and add multiplication algorithm, Booth's algorithm. (signed and unsigned)</p>
<ul style="list-style-type: none"> Review memory Hierarchy of computer system and study the concept of associative and cache memory in real world scenario. 	<p>UNIT 7 Memory Organization [4 Hrs.] 7.1 Memory hierarchy 7.2 Memory interfacing diagram (RAM and ROM with 8085) 7.3 Associative memory 7.4 Cache Memory and mapping techniques</p>
<ul style="list-style-type: none"> Familiarize with serial and parallel communication interfaces and introduce various methods for improving I/O performances. 	<p>UNIT 8 Input/Output Organization [4 Hrs.] 8.1 Serial and parallel communication interfaces 8.2 Programmed I/O 8.3 Interrupts, types of interrupts, Interrupt processing, Interrupt Hardware and priority 8.4 Direct Memory Access, I/O Processors</p>
<ul style="list-style-type: none"> Understand with the concept of instruction pipelining and multicore architecture in modern processor. 	<p>UNIT 9 Advance Architectures [4 Hrs.] 9.1 RISC and CISC Fundamentals 9.2 Instruction Pipeline, Register window 9.3 Flynn's Taxonomy, MIMD system topologies and architectures 9.4 Introduction to multicore architecture</p>

5. Laboratory Works

The laboratory works should include following concepts:

1. Assembly language program using 8085 microprocessor trainer kit or any software simulator.
 - 1.1 Use of all types of instructions and addressing modes. Programs including basic arithmetical, logical, looping, bitwise and branching instructions.
2. Computer Arithmetic can be implemented with C/C++.

6. List of Tutorials:

The various tutorial activities that outfits this course should cover all the content of this course to give students a space to engage more actively with the course content in the presence of instructor. Students should submit tutorials as assignments or class works to the instructor for evaluation. The following tutorial activities of 15 hrs should be conducted to cover all the content of this course:

A. Discussion based Tutorials [2 hrs]

1. Comparative analysis of Von-Neumann, Harvard and modified Harvard Architecture.
2. Applications of microprocessor and microcontroller based system in real world.
3. Hardware and programmable module of 8 bit microprocessor.
4. Interpret the concept of memory segmentation and pipelining in 16 bit microprocessor.
5. Review each entity memory hierarchy for modern processors.
6. Interfacing of DMA, interrupt controller and UART with 8085 microprocessor.
7. Comparative analysis of different aspects of computing system as defined in Flynn's Classification.

B. Assembly level programming tutorials [3 hrs]

1. Assembly level programming illustrating data transfer instructions, arithmetic instructions, logical instructions and branching instructions in 8085 microprocessor.
2. Enlighten PUSH and POP instructions using appropriate assembly level programs.
3. Assembly level programming for simple sequencing program, multiplication, division, table processing and sorting.
4. Timing diagram for different types of instructions and RTL of each machine cycle involved during the execution of instructions.

C. Design tutorials[3 hrs]

1. Design a CPU for any given registers set, instruction set and state diagram. Show the RTL code for each execution cycle.
2. Develop a control unit for any given state diagram.
3. Design a micro-sequencer control unit for any given specifications following design procedure.

D. Computer Arithmetic tutorials [3 hrs]

1. Perform arithmetic addition and subtraction in signed and unsigned notation for any given numbers.
2. Perform Multiplication operation for any given numbers using shift-add multiplication algorithm and Booth's algorithm.
3. Perform Division operation for any given numbers using restoring and Non restoring Division algorithm.

E. Project work [4 hrs]

Develop a case study report about any of the modern Advance superscalar processors. It should include the architecture of processor, control unit, memory as well as input output organization in detail. An oral presentation with the submission of report should be a part of work and must be included as a component for evaluation.

F. Evaluation system and Students' Responsibilities

Internal Evaluation	Weight	Marks	External Evaluation	Marks
Theory		30	Semester End examination	50
Attendance and class Participation	10%			
Assignments	20%			
Project work/Presentations	20%			
Term Exam	50%			
Practical		20		
Attendance and Lab Participation	20%			
Lab report	30%			
Practical Exam	30%			
Viva	20%			
Total Internal Marks		50		
Full marks=50+50				

Students Responsibility:

Each student must secure at least 45% marks separately in internal assessment and practical evaluation with 80% attendance in the class in order to appear in the semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester End Examination. Students are advised to attend all the classes, formal exam, and test and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

G. Prescribed Text Books and references

Text Books:

1. Gaonkar, Ramesh S., Microprocessor Architecture, Programming, and Applications with 8085, Prentice Hall. New Delhi
2. Stallings, W., "Computer Organization and Architecture", Eighth Edition, 2011, Pearson.

References:

1. Hall, Douglas V. Microprocessor and Interfacing programming and Hardware, McGraw Hill, New Delhi
2. Carpineili, John D., Computer system Organization and Architecture, Addison Wesley. Pearson Education Asia (LPE),2001
3. Malvino: Digital Computer Electronics and Introduction to Microcomputers
4. Dougals V. Hall: Microprocessor and Interfacing programming and Hardware, McGraw Hill.
5. Mano, M.M., "Computer Systems Architecture", Third Edition, 2011, Pearson.
6. Tanenbaum, A.S., "Structured Computer Organization", Fourth Edition, 2003, Pearson Education.

7. Rajaraman, V. et al, "*Computer Organization and Architecture*", 2011, PHI.
8. Sima, D. et al, "*Advanced Computer Architecture*", 2000, Addison Wesley.