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)
• Explain the communication and its processes • Describe the principles	• Definition of communication • Process of Communication • 7 C's Principles of communication

of communication	
	Unit 2: Technical communication Process (8hrs)
• 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	• 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)

• Describing the technical communication process at two different levels- document and collaboration processes.	• The Document Process: -
	  • Planning
	  • Writing the draft,
	  • Revising
	  • Delivery
	• The Collaboration Process
	  • The pros and cons of collaboration
	  • Collaborative writing process
	  • Strategies for effective collaborative writing

	Unit 4: Correspondence (8 hrs)

• Comparing the techniques of writing letters to apply for job
• Describe the role of correspondence in the form of memoranda and letters
	Correspondence
	• **Memo writing**
	  • Meaning and definition of memo writing
	  • Purpose of memos
	  • Format of memo
	• **Letter Writing**
	  • 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)

• Highlight the nature and methods of effective job interviews, meeting and minutes	**Interview:**
	    • Introduction
	    • Effective techniques for interview
	    • Interview and body language
	Meeting:
	    • Introduction
	    • Purposes of Meeting
	    • Notice (format of Meeting)
	    • Minutes of Meeting
	    • Purpose of Minutes
	    • Format of Minutes

	Unit 6: Technical Talk and Non-verbal (3 hrs) Communication

• Explain the methods to develop the presentation skill and strategies
• Describe the non-verbal communication and its forms
	• Oral communication
	    • Oral presentation
	    • Types of non-verbal communication
	    • Importance of non-verbal communication
	    • Characteristics of effective presentation

	Unit 7: Writing Proposals and Reports (8 hrs)

• Explain effective and efficient methods for writing the reports and proposals	**Proposal writing**
	    • Introduction
	    • Components of proposals: Title, Introduction, Statement of Problem, Literature Review, Methodology, Budgeting, Output
	    • Types of proposal
	Report Writing
	    • Introduction
	    • Different types of Report
	    • Elements of Report :Title, Acknowledgement, Abstract, Introduction, Methodology, Results/Findings, Conclusion and recommendation, References

	Unit 8: Real-Life Scenarios and Role-Playing (3 hrs)

• Enhance the quality of life job interviews
• Explain how to resolve
	• Mock job interviews
	    • Negotiating contracts and agreements
	    • Resolving IT-related conflicts

IT related conflicts involving group discussions	• Group discussions on IT trends and innovations
	Uni 9: Grammar and Usage (3 hrs)
• Describe grammatical items and transform the sentences as required. • Explain the varieties of English with focus on usage	• 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 Pubication 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
 • Indefinite
 • Definite
 • Improper and
 • Double integration
 • Symbolic calculation of integration using any software tools (MATLAB/Mathematica/Oct ave etc.)
	Unit 1: Fundamental of integrals [10 Hrs]
	 1.1 Introduction
	 1.2 Indefinite integrals
	 1.3 Techniques of integration
	  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)

• Evaluate area and volume by integration	**Unit 2: Application of integration [7Hrs]** 2.1 Introduction 2.2 Application in economics (Determination of total cost and total revenue function) 2.3 Area between the curves 2.4 Arc length of curves 2.5 Volume of solid of revolution (Disks and Washers) 2.6 Area of surface of revolution, 2.7 Consumer's surplus and producer's surplus

• Solve first and second order differential equations.	**Unit 3: Differential equations [7 Hrs]**
	3.1 Introduction
	3.2 Order and degree of ordinary differential equations.
	 3.3 Solution of differential equations of first order by
	       3.3.1 Separation of variables
	       3.3.2 Homogeneous
	       3.3.3 Linear
	       3.3.4 Equation reducible to linear form (Bernoulli's equation)
	       3.3.5 Linear and exact differential equations
	3.4 Second order homogenous ODE with constant coefficients.
	3.5 Second order Non homogenous ODE (Concept only)

• Solve the problem related to Vector spaces, subspaces, linear dependent and independent, and Eigen values and Eigen vectors	**Unit 4: Vector Space [6 Hrs]** 4.1 Introduction 4.2 Vector spaces and subspaces with example 4.3 Linear combination of vectors 4.4 Linear dependence and independence of vectors 4.5 Basis and dimension of vector space

	4.6 Eigen values and Eigen vectors.
• 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
• 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 trignomteric 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

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<tr><td colspan="2" align="center">Pokhara University
Faculty of Science and Technology</td></tr>
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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

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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**
	Unit I: The Conceptual Foundation of Accounting (7 Hours)
Explain the ccounting principles and theories.	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
	Unit II: Basics of Corporate Reporting (5 Hours)

Describe the financial information clearly to stakeholders and ensure adherence to accounting standards and regulations.	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

	Unit III: Processing and Recording Business Transactions (6 Hours)

Explain in precise systematic documentation of all financial activities within an organization.	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 Evens
	      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 Journals0

	3.2.4 General Ledger (Standard Format and T-Account) 3.2.5 Normal Account Balances 3.2.6 Trial Balance (Meaning/ Objectives/ and Preparation) 3.2.7 Use of Excel in Processing Business Transactions
	Unit IV: Preparation of Financial Statement (15 Hours)

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.	4.1 Income Statement
	    4.1.1 Concept of Income Statement
	    4.1.2 Basic Concepts, Principles, and Conventions used in Income Statement
	    4.1.3 Major Components of Income Statement
	    4.1.4 Preparation of Income Statement (vertical multi-step format)
	    4.1.5 Statement of Retained Earnings
	4.2 Balance Sheet
	    4.2.1 Concept of Balance Sheet
	    4.2.2 Basic Concept, Principles, and Conventions used in Balance Sheet
	    4.2.3 Major Components of Balance Sheet
	    4.2.4 Preparation of Balance Sheet
	    4.2.5 Use of Computers in Preparation of Income Statement and Balance Sheet
	4.3 Cash Flow Statement
	    4.3.1 Meaning of Cash Flow Statement
	    4.3.2 Purpose of the Cash Flow Statement
	    4.3.3 Importance of Cash Flow Statement
	    4.3.4 Classification of Cash Flow Activities
	    4.3.5 Preparation of Cash Flow Statement
	    4.3.6 Two Methods of Reporting Cash Flow from Operating Activities
	    4.3.7 Accruals and Cash Basis Accounting
	    4.3.8 Reconciling Cash Flow under Operating Activity using Indirect Method
	    4.3.9 Use of Computers in Preparation of Cash Flow Statement
	4.4. Financial Ratios based on Financial Statements
	    4.4.1 Liquidity Ratios
	    4.4.2 Leverage Financial Ratios
	    4.4.3 Efficiency Ratios
	    4.4.4 Profitability Ratios

Explain "cash and cash equivalents" in financial management, enabling effective liquidity management strategies and minimizing financial risk for the organization.	**Unit V: Accounting for Cash and Cash Equivalent (6 Hours)** 5.1. Components of Cash and Cash Equivalent 5.2 Need for Adjustment to Accounting Records 5.3 Preparation of the Bank Reconciliation Statement 5.4 Petty Cash 5.5 Balance Sheet Presentation of Cash and Cash Equivalent 5.6 Internal Control System 5.7 Cash Control (Receipt and Disbursement)
	Unit VI: Inventories and Cost of Goods Sold (9 Hours)
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

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: 1. Hermanson, H.R. and Edwards, D.J. Financial Accounting: *A Business Perspective.* USA: Von Holffmann Press. 2. Kimmel, P.D., Weygandt, J.J., & Kieso, D.E. *Financial Accounting*. New Delhi: Wiley India Pvt. Ltd. 3. Narayanswamy, R. *Financial Accounting: A Managerial Perspective.* New Delhi: Prentice Hall of India. 4. Koirala, M.P., Acharya, C., Sharma, L.P.B., Sharma, N., & Gautam, C.M. *Financial Accounting*. Kathmandu: Buddha Academic Enterprises. 5. Nepal Accounting Standard (NASs). 6. 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

Unit-1 Introduction to C Programming	3 hours
- Review about algorithm and flowchart. - Describe history and features of C - Explain the basic construct of structured programming	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

Explain the basic constructs of C language	2.1 C character set, Tokens,
	2.2 Keywords and reserved words
	2.3 Identifiers with naming convention.
	2.4 Constants and Variables
	   2.4.1 Introduction to Constants and Variables
	   2.4.2 Variable Declaration
	   2.4.3 Variable types
	 2.5 Datatypes
	 2.6 Operator
	      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

Describing the role of control statement with its types	3.1 Clean code practices
	3.2 Sequential control Statement
	3.3 Selection Control Statement
	   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
	   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
- 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	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
- 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	5.1 Introduction to function 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:

2

	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**
• 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**
▪ 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**
▪ 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.

Pokhara University
Faculty of Science and Technology

Course Code: ELX 112 (3 Credits)   Full Marks: 100
Course Title: Microprocessor and Computer Architecture (3-3-1)   Pass Marks: 45
Nature of Course: Theory and Practical   Total Lectures: 48 Hrs
Level: Bachelor   **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
• Familiarize with fundamentals of microprocessor-based system along with their real-world applications.	**Unit 1 An overview of computer and Microprocessor [3 Hrs]** 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

• Describe the architecture of 8085 microprocessor and basic assembly level programming.
• Explain the machine cycles involved during the execution of instructions.
	UNIT 2 Architectural and assembly language programming of 8085 [12 Hrs.]
	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

	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
• Familiarize with the architecture of 16 bit microprocessor 8086. • concept of memory segmentation and pipelining in modern processor.	**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
• Familiarize with CPU Fundamental	**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
• Examine the basic structure of a micro-sequencer and Hardwired Control Unit	**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
• Understand the representation of binary numbers in signed and unsigned notation along with the algorithms used for the basic arithmetic operations.	**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)
• Review memory Hierarchy of computer system and study the concept of associative and cache memory in real world scenario.	**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
• Familiarize with serial and parallel communication interfaces and introduce various methods for improving I/O performances.	**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
• Understand with the concept of instruction pipelining and multicore architecture in modern processor.	**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

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.

3

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**		
Attendance and class Participation	10%			
Assignments	20%			
Project work/Presentations	20%			
Term Exam	50%			
Practical		**20**	**Semester End examination**	**50**
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 all, "*Computer Organization and Architecture*", 2011, PHI.
8. Sima, D. et all, "*Advanced Computer Architecture*", 2000, Addison Wesley.