



Far Western University

Faculty of Engineering

Course Title:	Programming in C	Course Code:	CT1101
Course Credit:	3 (3-1-2)	Year/Semester:	I/I
Level	Undergraduate	Program	Computer Engineering

Course Description

This course introduces students to programming fundamentals using the C language. It emphasizes problem-solving, algorithmic thinking, and structured programming concepts. Through lectures, lab experiments, and project work, students will learn to design, implement, test, and document programs using modular techniques and good coding practices.

General Objectives

- Provide a solid foundation in structured programming principles using C.
- Develop the ability to design algorithms and translate them into efficient C programs.
- Build problem-solving skills using control structures, functions, arrays, pointers, and file handling.
- Encourage good programming practices such as modularity, documentation, and debugging.
- Enable students to apply learned concepts in a practical project environment.

Learning Outcome

After completing this course, students will be able to:

LO 1: Develop algorithms to solve computational problems and implement them in C.

LO 2: Describe and apply fundamental concepts, syntax, and semantics of the C language.

LO 3: Utilize arrays, strings, pointers, structures, and files to organize and manipulate data effectively.

LO 4: Apply modular programming techniques to design and implement reusable code.

LO 5: Demonstrate problem-solving, teamwork, and documentation skills through practical lab and project work.

Content

Learning Objectives	Content	Hrs.
LO 1	Unit 1: Introduction to Programming 1.1 Computer Software and their classification 1.2 Time-line of programming languages 1.3 Problem Analysis, Algorithm, Flowchart 1.4 Program execution, compilation, debugging, testing	4
LO 2	Unit 2: Fundamentals of C programming 2.1 Structure of a C Program 2.2 Character set, Keywords, and Identifiers 2.3 Datatypes in C, variables, declaration 2.4 Constants 2.5 Operators in C 2.6 Statements and Expressions 2.7 Type Conversion and Type Casting	6
LO 2	Unit 3: Writing a program in C 3.1 Input/output Statements 3.2 Formatted input/output 3.3 Unformatted input/output 3.4 Preprocessor Directives	4
LO 2	Unit 4: Control Structure 4.1 Condition statements <ol style="list-style-type: none"> if statement if-else statement Nested if-else statement switch statement 4.2 Loop Statements <ol style="list-style-type: none"> for loop while loop do-while loop Nested loops 4.3 Break Control Statements <ol style="list-style-type: none"> Break Continue go-to statement 	6
LO 2, LO 4	Unit 5: Functions 5.1 Introduction 5.2 Types of function 5.3 Function Prototypes 5.4 Function definition and return statement	8

	5.5 Function invocation 5.6 Passing Parameters to the function 5.7 Recursive Functions 5.8 Variable scope and storage Class	
LO 2, LO 3, LO 4	Unit 6: Arrays and Strings 6.1 Defining an Array 6.2 Accessing Array Elements 6.3 One-dimensional Arrays 6.4 Multi-dimensional Arrays 6.5 Strings and string manipulation 6.6 Passing Array and String to function	6
LO 2, LO 3, LO 4	Unit 7: Pointers 7.1 Introduction 7.2 Pointer declaration 7.3 Pointer arithmetic 7.4 Pointer and Array 7.5 Passing Pointers to a Function 7.6 Pointers and Strings 7.7 Dynamic Memory Allocation	6
LO 3, LO 4	Unit 8: Structure and Data Files 8.1 Introduction to Structure 8.2 Structure declaration and initialization 8.3 Introduction to data files 8.4 Defining opening and closing a file 8.5 Input/Output operations on Files	5

Reference books

1. Reema Thareja, *"Introduction to C Programming"*, Oxford University Press
2. Kelly & Pohl, *"A Book on C"*, Benjamin/Cumming
3. Brian W. Keringhan & Dennis M. Ritchie, *"The 'C' Programming Language"*, PHI
4. Bryons S. Gotterfried, *"Programming with C"*, TMH
5. Yashavant Kanetkar, *"Let Us C"*, BPB

Method of Instruction

Lecture, Lab, Project and Tutorial

Laboratory Works

The laboratory component reinforces theoretical learning through hands-on experience. Students will learn to:

- Translate algorithms into working programs.
- Test, debug, and improve code systematically.

- Develop structured and well-documented programs.
- Collaborate on programming tasks and manage small-scale projects.

Generic Laboratory Topics

- Introduction to the C Environment: Writing, compiling, and executing simple programs.
- Data Types and Expressions: Programs using variables, constants, operators, and type casting.
- Control Structures: Programs using decision-making and looping constructs.
- Functions and Recursion: Implementing user-defined functions and recursive algorithms.
- Arrays: One- and two-dimensional array manipulation, searching, and sorting algorithms.
- Strings: String handling and manipulation using and without library functions.
- Pointers: Using pointers with variables, arrays, and functions.
- Structures and Unions: Programs using structured data types for data organization.
- File Handling: Reading, writing, and updating data in files.

Project

Maximum of three students in a group must complete a mini project as part of the course. The project should integrate multiple programming constructs and include proper documentation, testing, and demonstration. Student may find the relevant topics by themselves or the course instructor will provide the suitable topics for project. The evaluation of the project will be done in the following basics.

Aspect	Description	Weight (%)
Problem Analysis & Design	Problem understanding and design methodology	10
Implementation	Code correctness, modularity, and readability	30
Testing & Debugging	Proper validation and testing	20
Documentation & Presentation	Clarity, structure, and completeness	20
Viva/Defense	Conceptual understanding	20

Evaluation Approach

The evaluation of student performance shall be conducted in two distinct phases: Internal (Continuous) Assessment and Semester-End Examination. Student must pass the internal evaluation to qualify for the semester-end examination. The Internal Evaluation will be carried out as a continuous assessment (CA) process throughout the semester. It will include a range of formative assessment components designed to measure both theoretical understanding and practical competence. The evaluation modalities may comprise unit tests, take-home assignments, class tests, quizzes, mini projects, presentations, and viva-voce examinations, as deemed appropriate by the instructor. The Semester-End Examination shall be a comprehensive written examination, aimed at evaluating the students' overall conceptual understanding, analytical ability, and problem-solving skills acquired during the course.

Evaluation	Marks	Approach	Marks
Internal evaluation (Theory)	40 Marks	Assignment/Tutorial	8
		Attendance	4
		Quizzes	4
		Presentation/Class Performance	4
		Unit Tests/ Internal Assessments	20
Practical Examination	20 Marks (Internal)	Practical Report	16
		Attendance	4
	30 Marks (External)	Practical Exam	20
		Viva	10
Semester End Examination	60 Marks		60
	Total		150

Marks Distribution for End Semester Examination

Chapters/Units	Hours Allocated	Marks Distribution (Tentative)*
Unit I	4	5
Unit II	6	8
Unit III	4	5
Unit IV	6	8
Unit V	8	11
Unit VI	6	8
Unit VII	6	8
Unit VIII	5	7
Total	45	60

* There may be minor deviation in marks distribution.



Far Western University

Faculty of Engineering

Course Title:	Basic Electrical Engineering	Course Code:	EL1102
Course Credit:	3 (3-1-1.5)	Year/Semester:	I/I
Level:	Undergraduate	Program:	Computer Engineering

Course Description

This course introduces the concept of basic electrical engineering. It includes the basic concepts of dc circuit, ac circuit and magnetic circuits along with the operation of transformers and hydropower power systems. The courses also introduce electrical hazards and safety practices.

General Objectives

- Provide a good foundation in electrical circuit analysis
- Develop an ability to calculate and analyze the electrical circuit parameter using different methods
- Enable students to apply theoretical concept in practical circuits and measurements
- Enable students to adopt good electrical safety practices and first aid measures

Learning Outcome

After completing this course, students will be able to:

LO 1: Understand the need and operation of an Electrical System.

LO 2: Familiarize with dc circuit elements and perform circuit analysis.

LO 3: Familiarize with ac circuit elements and perform circuit analysis.

LO 4: Familiarize with poly phase ac circuit and perform circuit analysis

LO 5: Familiarize with concept of magnetic circuits and perform circuit analysis

LO 6: Demonstrate electrical safety practices

Content

Learning Objectives	Content	Hrs.
LO 1	Unit I: Introduction 1.1 Role of electricity in modern society 1.2 General layout of electrical power system 1.3 Generation, transmission & distribution of electrical power 1.4 Hydro power plant details and its operation 1.5 Classical grid and smart grid	4

LO 2	Unit II: DC Circuit Analysis 2.1 Electrical Circuits concepts 2.2 Linear and non- linear parameter, passive and active circuits 2.3 Resistors: characteristics (value, power rating, codes, tolerances), temperature coefficient, current, voltage, power relationships, 2.4 Series and parallel connection of resistance, equivalent resistance and its calculation 2.5 Star-delta transformation for resistances 2.6 Concept of power, energy and its calculations 2.7 Short and open circuit 2.8 Ideal and non-ideal sources, source conversion 2.9 Voltage divider and current divider formula 2.10 Kirchhoff's current and voltage laws 2.11 Mesh Analysis (without dependent source) 2.12 Nodal analysis (without dependent source)	16
LO 3	Unit III: Single Phase AC Circuit Analysis 3.1 Generation of alternating voltage, Sinusoidal Functions-terminology (phase, phase angle, amplitude, frequency, peak to peak value), average value and RMS or effective value of any type of alternating voltage or current waveform 3.2 Phasor algebra, characteristics of inductors and capacitors, inductors and capacitors in series and parallel, voltage current relationship in inductor and capacitor, impedance, admittance, reactance, 3.3 Steady state analysis of RL, RC and RLC circuits, 3.4 real power, reactive power and apparent power, power triangle, power factor and significance of power factor 3.5 Resonance in series and parallel RLC circuit. bandwidth, effect of Q-factor in resonance.	10
LO 4	Unit IV: Poly-Phase AC Circuit Analysis 4.1 Concept of a balanced three phase supply 4.2 Generation and differences between single phase over three phase system 4.3 Star & delta connected supply and load circuits. 4.4 Line and phase voltage/current relations, power measurement, concept of three-phase power and its	5

	measurement by single and two wattmeter method.	
LO 5	Unit V: Magnetic Circuits 5.1 Electromagnetism fundamentals, magnetic field and flux, magnetic field strength, MMF, Permeability of free space, Relative permeability, Reluctance and permeance, 5.2 Introduction to a simple magnetic circuit with air gap, 5.3 Comparison of magnetic circuit with electric circuit, 5.4 Series and parallel magnetic circuits, 5.5 Single phase transformers: construction, principle of operation, ideal transformers, voltage and current relationship, and turns ratio	5
LO 6	Unit VI: Electrical Hazards and Safety 6.1 Electric Shock, Human threshold of electric shock, 6.2 Safety measure for electric shock, Personal Protective Equipment, 6.3 First aid for electric shock, 6.4 Earth Leakage Circuit Breaker (ELCB), 6.5 Electrical fire and their causes, Types of fire extinguishers, 6.6 Occupational safety and health (OSH)	5

Reference books

1. R. L. Boylestad, *"Introduction of Electric Circuit"*, Pearson Education
2. E. Hughes, *'Electrical and Electronic Technology'*, Pearson Education
3. D. P. Kothari and I. J. Nagrath, *"Basic Electrical Engineering"*, Tata McGraw -Hill

Method of Instruction

Lecture, Lab, and Tutorial

Laboratory Works

The laboratory component reinforces theoretical learning through hands-on experience. Students will learn to:

- Connect and test electrical circuits.
- Verify laws of electrical circuits.
- Measure voltage, current power of ac and dc electric circuits.
- Study the operation of transformer and hydro power plant.
- Demonstrate first aid for electric shock

Generic Laboratory Topics

- To measure current, voltage and power across the passive components.
- To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
- To measure the current, voltage, power and power factor in a single-phase ac circuit.
- To measure three phase power by using two watt meter.
- To study the operation of single phase transformer.
- To study the operation of Earth Leakage Circuit Breaker
- To demonstrate and perform first aid for electric shock
- To study the operation of a hydropower plant through desk research and reporting.

Evaluation Approach

The evaluation of student performance shall be conducted in two distinct phases: Internal (Continuous) Assessment and Semester-End Examination. Student must pass the internal evaluation to qualify for the semester-end examination. The Internal Evaluation will be carried out as a continuous assessment (CA) process throughout the semester. It will include a range of formative assessment components designed to measure both theoretical understanding and practical competence. The evaluation modalities may comprise unit tests, take-home assignments, class tests, quizzes, mini projects, presentations, and viva-voce examinations, as deemed appropriate by the instructor. The Semester-End Examination shall be a comprehensive written examination, aimed at evaluating the students' overall conceptual understanding, analytical ability, and problem-solving skills acquired during the course.

Evaluation	Marks	Approach	Marks
Internal evaluation (Theory)	40 Marks	Assignment/Tutorial	8
		Attendance	4
		Quizzes	4
		Presentation/Class Performance	4
		Unit Tests/ Internal Assessments	20
Practical Examination	10 Marks (Internal)	Practical Report	8
		Attendance	2
	15 Marks (External)	Practical Exam	10
		Viva	5
Semester End Examination	60 Marks		60
	Total		125

Marks Distribution for End Semester Examination

Chapters/Units	Hours Allocated	Marks Distribution (Tentative)*
Unit I	4	5
Unit II	16	21
Unit III	10	13
Unit IV	5	7
Unit V	5	7
Unit VI	5	7
Total	45	60

* There may be minor deviation in marks distribution.



Far Western University

Faculty of Engineering

Course Title:	Engineering Mathematics I	Course Code:	SH1103
Course Credit:	3 (3-1-0)	Year/Semester:	I/I
Level:	Undergraduate	Program:	Computer Engineering

Course Description

This course provides a comprehensive study of advanced calculus, ordinary differential equations, and analytic geometry with emphasis on their applications in engineering. The course begins with applications of derivatives and antiderivatives to solve problems involving curves, areas, volumes, and physical quantities. It then develops techniques for solving ordinary differential equations and applies them to mathematical modeling. The latter part of the course focuses on plane analytic geometry and three-dimensional geometry, including conic sections, coordinate transformations, lines, planes, spheres, cones, and cylinders. The course aims to strengthen analytical skills and enhance the ability to apply mathematical concepts to real-world problems.

General Objectives

The course Engineering Mathematics I aim to equip undergraduate Computer Engineering students with strong mathematical foundations and analytical skills essential for modeling, analyzing, and solving engineering and computational problems. The objectives are to:

1. Develop proficiency in differential and integral calculus and their applications in engineering and physical sciences.
2. Enable students to formulate and solve ordinary differential equations arising in engineering systems and real-world problems.
3. Build conceptual understanding of plane and three-dimensional geometry for mathematical modeling and spatial reasoning.
4. Enhance problem-solving, logical reasoning, and analytical thinking skills necessary for advanced studies in computer engineering.
5. Prepare students to apply mathematical techniques in areas such as algorithms, computer graphics, machine learning, simulation, and system modeling.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- L01: apply differential calculus techniques to analyze curves by finding asymptotes, curvature, radius of curvature, and pedal equations for Cartesian and polar curves relevant to engineering applications.

L02: use antiderivatives and integral calculus to evaluate definite and improper integrals and apply Beta and Gamma functions in solving problems involving area, volume, arc length, surface of revolution, centroids, and moments of inertia.

L03: formulate and solve ordinary differential equations of first and higher order using standard analytical methods and apply them to model engineering systems such as electric circuits, resisted motion, mass–spring systems, and geometrical problems.

L04: analyze plane analytic geometry problems by identifying conic sections, performing coordinate transformations, and determining equations of conics in Cartesian and polar forms.

L05: solve three-dimensional geometry problems involving lines, planes, spheres, cones, and cylinders, and apply these concepts to spatial modeling and geometric interpretations in engineering contexts.

Contents

Learning Objectives	Content	Hrs.
L01	Unit I: Application of Derivatives 1.1 Review of derivatives, techniques of evaluation 1.2 Indeterminate forms, L-Hospital rule 1.3 Asymptotes to Cartesian and polar curves 1.4 Pedal equation, curvature and radius of curvature to cartesian and polar curves	8
L02	Unit II: Application of Antiderivatives 2.1 Review of definite and indefinite integrals 2.2 Differentiation under integral sign 2.3 Improper integrals, Beta and Gamma functions with their applications 2.4 Application of antiderivatives to find area, arc length, volume, surface of revolution, centroid and moment of inertia under area of curve	10
L03	Unit III: Ordinary differential equations and their applications 3.1 Review of formation, order, degree, solution of first order first degree differential equation by variable separation method and solution of homogeneous and equations reducible to homogeneous equation. 3.2 Linear differential equation of first order and equations reducible to linear differential equation, Bernoulli's equations 3.3 Exact differential equations of first order of the form $M(x,y)dx + N(x,y)dy = 0$, equations reducible to exact form , finding integrating factors by inspection, for a	14

	<p>homogeneous equations and of the form $M(xy)ydx + N(xy)x = 0$</p> <p>3.4 First order and higher degree differential equations, equations solvable for p, x and y and Clairaut's form.</p> <p>3.5 Application of first order differential equation: modeling electric circuit, resisted motion, geometrical applications (Cartesian and polar curves).</p> <p>3.6 Second order and first degree differential equations with constant and variable coefficient, Cauchy's equations. Modeling mass spring system.</p>	
L04	<p>Unit IV: Plane Analytic Geometry</p> <p>4.1 Review of conics, eccentricity, tangents, normal, chords</p> <p>4.2 Transformation of coordinates: translation and rotations</p> <p>4.3 Equation of conic in Cartesian and polar form, identification of conics</p>	5
L05	<p>Unit V: Three-dimensional geometry</p> <p>4.1 Review of coordinates, direction ratio and direction cosines, plane</p> <p>4.2 Straight line: symmetrical and general form</p> <p>4.3 Coplanar lines, shortest distance</p> <p>4.4 Sphere: equation of sphere, plane section, great circle, intersection of two spheres, sphere through a given circle, tangent plane</p> <p>4.5 Cones and cylinders: Equation of cone with a conic as guiding curve, quadratic cones with vertex at origin and under given conditions, general equation of cylinder, enveloping cylinder</p>	8

References

1. E. Kreyszig, *Advanced Engineering Mathematics*, 10th edition, Wiley Publication
2. S.S. Sastry, *Engineering Mathematics*, 4th edition, Vol 1 and 2, PHI Learning Private Limited
3. Peter V. O'Neil, *Advanced Engineering Mathematics*, Thomson Publication
4. A. Jaffrey, *Advanced Engineering Mathematics*, Academic Press
5. Shanti Narayan, Dr. P.K. Mittal, *Analytic Solid Geometry*, S. Chand and Company Limited
6. V. Parajuli; S. Ghimire; A.K. Bhandari ; H.P. Gnawali and R. Paudel, *Engineering Mathematics- I*, Asmita Publication

Method of Instruction

Lecture and Tutorial

Tutorials

Exercises and explanations of

1. all review units (1.1, 2.1, 3.1, 4.1 and 5.1) [5]
2. asymptotes [1]
3. curvature and radius of curvature [2]

- | | |
|--|-----|
| 4. differentiation under integral sign | [1] |
| 5. application of antiderivatives | [2] |
| 6. application of first order differential equations | [2] |
| 7. cones and cylinders | [2] |

N.B.: The review units (1.1, 2.1, 3.1, 4.1 and 5.1) are only for internal evaluation and should be completed in tutorial classes.

Evaluation Approach

Performance of the students will be evaluated in two phases: **Internal assessment** and the **semester-end examination**. To be eligible for the semester-end examination, a student must successfully pass the internal evaluation. The internal evaluation will be carried out as a continuous assessment process throughout the semester which includes a range of assessment components designed to measure both theoretical understanding and practical applications. The evaluation includes unit tests, midterm exams take-home assignments, class tests, quizzes, mini projects, and presentations. The **semester-end examination** will be a comprehensive written test which is designed to assess students' overall conceptual grasp, analytical thinking, and problem-solving skills developed throughout the course.

Evaluation	Marks	Approach	Marks
Internal evaluation (Theory)	40 Marks	Assignment/Tutorial	8
		Attendance	4
		Quizzes	4
		Presentation/Class Performance	4
		Unit Tests/ Internal Assessments	20
Semester End Examination	60 Marks		60
	Total		100

Marks Distribution for End Semester Examination

Chapters/Units	Hours Allocated	Marks Distribution (Tentative)*
Unit I	8	10
Unit II	10	13
Unit III	14	19
Unit IV	5	7
Unit V	8	11
Total	45	60

* There may be minor deviation in marks distribution.



Far Western University

Faculty of Engineering

Course Title:	Engineering Physics	Course Code:	SH1104
Course Credit:	3 (3-1-2)	Year/Semester:	I/I
Level:	Undergraduate	Program:	Computer Engineering

Course Description

This course intends to enable the students to be acquainted with the basic concepts and principles of physics in the field of engineering. Students will be familiarized with the mechanical oscillations, physical optics, geometrical optics, electrostatics, electromagnetic induction, Maxwell's equations, electromagnetic waves and matter waves. The background of physics corresponding to Higher Secondary Level is assumed.

General Objectives

At the end of this course students should be able to:

- acquire basic concept and knowledge in physics.
- apply this knowledge as base for studying major courses.
- introduce the concepts and methods of mechanics, optics, electrostatics, magnetism, electromagnetic induction and electromagnetic waves, needed for application in various areas.

Content

Learning Outcomes	Content	Hrs.
<ul style="list-style-type: none"> • Understand the types of oscillation • Know the concept of resonance and its uses in the field of engineering • Built problem solving skill • Able to compare the mechanical and electrical oscillation 	Unit 1: Oscillation <ul style="list-style-type: none"> 1.1 Introduction 1.2 Types of mechanical oscillation (free, damped and forced) 1.3 Examples of free oscillation: Physical and Torsion pendulum 1.4 Relaxation time, quality factor and sharpness of resonance 1.5 LC and LCR oscillation 	5
<ul style="list-style-type: none"> • Understand the interference and formation of maxima, minima • Able to know the newton's rings pattern • Understand the difference between interference and 	Unit 2: Optics <ul style="list-style-type: none"> 2.1 Interference: Introduction, interference in thin films, wedge shaped, Newton's rings 2.2 Diffraction: Introduction and types, diffraction from a single slit, diffraction grating, x-ray diffraction and its uses 2.3 Polarization: Double refraction, Nicol prism, retardation plates (half and 	13

<p>diffraction</p> <ul style="list-style-type: none"> Understand the energy distribution in a single slit diffraction Understand the uses of x-ray in crystallography Using the knowledge of double refraction and know the role of retardation plate Understand the principles of laser and its application Know the principles and uses of optical fiber Know the combination of lens, cardinal points and chromatic aberration 	<p>quarter wave plate), optical activity and specific rotation</p> <p>2.4 Laser and Fiber optics: Principles and uses of laser, He-Ne laser, optical fiber (Propagation, types and uses)</p> <p>2.5 Combination of lenses, cardinal points, chromatic aberration and its removal (contact and separation in finite distance by calculus method)</p>	
<ul style="list-style-type: none"> Understand the concept of electric field and potential Able to calculate the field and potential for point charge and continuous charge distribution Understand the principle of capacitor and role of dielectrics Know the concept of time constant in charging and discharging of capacitor Able to compare the general capacitor with supercapacitor 	<p>Unit 3: Electrostatics</p> <p>3.1 Electric field: electric field due to electric dipole (at axial and equatorial point), field due to quadrupole on axial line, electric field due to charged ring and disk on axis, equipotential surface</p> <p>3.2 Electric potential: potential due to dipole at any point, potential due to quadrupole at axial line, potential due to charged ring and disc on axis, relation between field and potential</p> <p>3.3 Capacitor: Cylindrical capacitor, energy stored in capacitor and electric energy density, charging and discharging of capacitor, capacitor with dielectrics: dielectrics and Gauss law, Supercapacitor and its application</p> <p>3.4 High intensity electrostatic fields: uses and hazards (xerography, electrostatic precipitation)</p>	7
<ul style="list-style-type: none"> Understand the microscopic view of Ohm's law Understand the knowledge of hall voltage and its uses Know the concept of charge particles in magnetic field Know the difference 	<p>Unit 4: Magnetism</p> <p>4.1 Ohm's law: microscopic view and resistivity, Lenz law</p> <p>4.2 Hall effect, Hall voltage, quantum hall effect</p> <p>4.3 Circulating charges: Cyclotron, limitation of cyclotron</p> <p>4.4 Semiconductors and superconductors, types of superconductors, BCS theory of superconductivity</p> <p>4.5 Biot and Savart's law with its application (magnetic field due to a</p>	6

between semiconductor and superconductors <ul style="list-style-type: none"> • Able to determine magnetic field by using Ampere's law and Biot & Savart's law 	circular current loop) 4.6 Ampere's law and its application: magnetic field due to long straight wire carrying current	
<ul style="list-style-type: none"> • Understand the electromagnetic induction, self-induction and mutual induction • Understand the concept of displacement current and eddy current 	Unit 5: Electromagnetic Induction 5.1 Faraday's laws, induction and energy transformation, self-induction and mutual induction, 5.2 Energy stored in a magnetic field and energy density, 5.3 Induced magnetic field, modified Ampere's law and displacement current 5.4 Eddy Current and its application	5
<ul style="list-style-type: none"> • Able to know the physical meaning of Maxwell's equations • Able to convert Maxwell's equations from integral to differential form and vice versa • Understand the relation between em wave and mechanical wave • Know the charge conservation theorem • Able to determine the intensity of em wave 	Unit 6: Electromagnetic Waves 6.1 Maxwell's equations in integral and differential form, Conversion of Maxwell's equation from integral to differential form and from differential to integral form 6.2 Electromagnetic wave equations in non-conducting and conducting medium and free space in terms of electric and magnetic fields 6.3 Plane solution of electromagnetic wave equation and amplitudes of electric and magnetic fields 6.4 Continuity equation 6.5 Energy transfer and Poynting vector, radiation pressure	5
<ul style="list-style-type: none"> • Understand the reason behind the development of wave mechanics • Know the concept of de-Broglie wavelength and wave particle duality • Know the concept of wave functions & its significance • Understand Schrodinger wave equation and its application for energy quantization and tunnel effect 	Unit 7: Matter waves 7.1 Inadequacy of classical mechanics, development of quantum mechanics, quantization of energy, group velocity and phase velocity, de-Broglie wavelength, Heisenberg uncertainty principle, Wave functions and its significance 7.2 Time-independent and time-dependent Schrodinger wave equations 7.3 One dimensional infinite potential well, barriers tunneling	4

Reference books

1. Halliday, Resnick, Walker (2016), "*Fundamental of Physics*", John Wiley & Sons. Inc.
2. Brij Lal and N. Subrahmanyam, Latest edition, "*A Text Book of Optics*", S. Chand Pub.
3. J. Franklin, (2005), "*Classical Electromagnetism*", Pearson Education.
4. Pokharel, Bhattarai and Paudel, (2024, third edition), "*Fundamental of Engineering Physics*", Bechmark Publication.
5. Brij Lal and N. Subrahmanyam, Latest edition, "*Waves and Oscillation*", S. Chand Pub.
6. Basudeva, A. S., Latest edition "*Modern Engineering Physics*", S. Chand Pub.
7. R. K. Gaur and S. L. Gupta, (1993), "*Engineering Physics*", Dhanpat Rai Pblisher.

Method of Instruction

Lecture, Lab and Tutorial

Laboratory Works

1. To determine the acceleration due to gravity and radius of gyration of the given metal bar using bar pendulum.
2. To determine the modulus of elasticity of the given material and moment of inertia of the circular disc about the wire as an axis passing through its center and perpendicular to its plane by using torsional pendulum.
3. To determine the low resistance of the given wire and hence determine the resistance per unit length of the given material by using carry foster bridge.
4. To study the growth and decay of current in LR circuit then determine the self-inductance of the given inductor.
5. To determine the wavelength of sodium light by using Newton's rings.
6. To determine the wavelength of sodium light by using wedge-shaped method.
7. To determine the wavelength of laser light using diffraction grating and hence determine the thickness of hair.
8. To determine the focal length of two lenses when they are separated by some finite distance.
9. To determine the chromatic aberration of a convex lens between red and blue colors.
10. To determine the capacitance of given capacitor by the method of charging and discharging through a resistor.
11. To plot the graph between frequency and current in series LCR circuit and hence determine the quality factor of the circuit.
12. To determine the specific rotation of sugar solution using polarimeter.
13. To determine the dielectric constant of the given material.

Evaluation Approach

The evaluation of student performance shall be conducted in two distinct phases: Internal (Continuous) Assessment and Semester-End Examination. Student must pass the internal evaluation to qualify for the semester-end examination. The Internal Evaluation will be carried out as a continuous assessment (CA) process throughout the semester. It will include a range of formative assessment components designed to measure both theoretical understanding and practical competence. The evaluation modalities may comprise unit tests, take-home assignments, class tests, quizzes, report, and viva-voce examinations, as deemed appropriate by the instructor. The Semester-End Examination shall be a comprehensive written examination, aimed at evaluating the students' overall conceptual understanding, analytical ability, and problem-solving skills acquired during the course.

Evaluation	Marks	Approach	Marks
Internal evaluation (Theory)	40 Marks	Assignment/Tutorial	8
		Attendance	4
		Quizzes	4
		Presentation/Class Performance	4
		Unit Tests/ Internal Assessments	20
Practical Examination	10 Marks (Internal)	Practical Report	8
		Attendance	2
	15 Marks (External)	Practical Exam	10
		Viva	5
Semester End Examination	60 Marks		60
	Total		125

Marks Distribution for End Semester Examination

Chapters/Units	Hours Allocated	Marks Distribution (Tentative)*
Unit I	5	6
Unit II	13	18
Unit III	7	9
Unit IV	6	8
Unit V	5	7
Unit VI	5	7
Unit VII	4	5
Total	45	60

* There may be minor deviation in marks distribution.



Far Western University
Faculty of Engineering
Mahendranagar, Kanchanpur, Nepal

Course Title:	Engineering Drawing	Course Code:	AR1105
Course Credit:	2 (1-0-4)	Year/Semester:	I/I
Level:	Undergraduate	Program:	Computer Engineering

Course Description

This course provides a comprehensive introduction to engineering drawing, covering instrumental techniques, freehand lettering, dimensioning, and the use of scales for accurate graphical communication. It develops students' ability to construct geometric shapes, curves, solids, and solve spatial problems through descriptive geometry and multiview projection. The course further trains students to interpret and produce orthographic drawings, sectional views, and developments of complex surfaces used in engineering practice.

General Objectives

The general objectives of this course are:

- to provide foundational knowledge on essential engineering drawing instruments, conventions, lettering forms, dimensioning symbols, and basic geometric elements used in technical graphics.
- to develop familiarity with key instrumental and freehand drawing techniques, including dimensioning, scaling, and geometric constructions
- To develop students' capacity to integrate various drawing tools and techniques in order to visualize, analyze, and represent objects coherently through descriptive geometry and orthographic projection, linking two-dimensional and three-dimensional representation.
- To foster the ability to interpret and produce complete engineering drawings—including sectional views, developments, and intersections of solids—in a manner that supports advanced problem-solving and professional communication consistent with engineering standards.

Learning Outcome

After completing this course, students will be able to:

L01: Identify and apply standard engineering drawing instruments, conventions, lettering styles, dimensioning methods, and scaling techniques for basic technical communication.

L02: Use and demonstrate proficiency in instrumental drawing, freehand lettering, dimensioning, and geometric constructions to produce accurate engineering sketches and diagrams.

L03: Visualize, analyze, and construct two-dimensional and three-dimensional representations of objects using descriptive geometry and orthographic projection techniques.

L04: Interpret, generate, and evaluate advanced engineering drawings—including sectional views, developments, and intersections of surfaces and solids—to solve engineering graphical problems in new or complex contexts.

L05: Draw and interpret three-dimensional objects using appropriate pictorial projection methods, including axonometric, oblique, and perspective projections, in engineering drawing.

Content

Learning Objectives	Content	Hrs.
L01	Unit I: Instrumental Drawing; Practices and Techniques 1.1 Equipment and Materials; Description of drawing instruments, auxiliary equipment and drawing materials 1.2 Techniques of Instrumental Drawing, Pencil sharpening, securing paper, proper use of T- squares, triangles, scales, dividers, and compasses, erasing shields, French curves, inking pens.	2
L01&L02	Unit II: Freehand Technical lettering 2.1 Lettering strokes, letter proportions, use of pencils and pens, uniformity and appearance of letters, freehand techniques, inclined and vertical letters and numerals, upper and lower cases, Standard English lettering forms	2
L01&L02	Unit III: Dimensioning 3.1 Fundamentals and techniques; Size and location dimensioning ; measurement units; SI conventions 3.2 General dimensioning practices; placement of dimensions; aligned and unidirectional	2
L01 & L02	Unit IV: Engineering Scale: 4.1 Use of scales, , reducing and enlarging drawings 4.2 Representative Factor, 4.3 Construction and Types of Scales, Plain Scales, Diagonal Scales, Vernier Scales, Comparative Scales 4.4 Scale of Chords	2
L01&L02	Unit V Applied Geometry 5.1 Plane Geometrical construction; Bisecting and trisecting lines and angles, proportional division of lines, construction of angles, triangles, squares, and polygons. Construction using	6

	<p>tangents and circular arcs</p> <p>5.2 Methods of drawing standard curves such as ellipses, parabolas, hyperbolas, involutes, spirals, cycloid, helices (cylindrical and conical).</p> <p>5.3 Solid Geometrical Construction; Classification and pictorial representation of solid regular objects such as; Prisms: square, cubical, triangular and oblique Cylinders: right and oblique; Cones: right and oblique, Pyramid : square, triangular, oblique, truncated, Doubly-Curved and, Warped Surfaces: Sphere, Torus, oblate ellipsoid, serpentine, paraboloid, hyperboloid</p>	
L01, L02 & L03	<p>Unit VI Basic Descriptive Geometry</p> <p>6.1 Introduction: Application of descriptive geometry, principles to the solution of problems involving positioning of objects in three-dimensional space</p> <p>6.2 The projection of points, lines, planes and solid in space</p> <p>6.3 Projection of Solids Placed in different positions,</p> <p>6.4 Parallel Lines</p> <p>6.5 True Length of Lines; horizontal , inclined and oblique lines</p> <p>6.6 Perpendicular Lines</p> <p>6.7 Bearing of a Line</p> <p>6.8 Point view or End View of a Line</p> <p>6.9 Shortest Distance from a point to a Line</p> <p>6.10 Principal Lines of a plane</p> <p>6.11 Edge View of a plane</p> <p>6.12 True shape of an Oblique plane</p> <p>6.13 Intersection of a Line and a plane</p> <p>6.14 Angle Between a Line and a plane</p> <p>6.15 Angle Between Two Intersecting Lines</p> <p>6.16 Angle Between Two Non- Intersecting (Skew) lines</p> <p>6.17 Angle between two planes</p> <p>6.18 Shortest Distance Between Two Skew Lines</p>	10
L01, L02 & L03	<p>Unit VII Theory of Projection and Multi view (Orthographic) Projection Drawing</p> <p>7.1 Common types of projections – Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection</p> <p>7.2 System of orthographic projection: First angle projection and Third angle projection</p> <p>7.3 Principal Views; Methods for obtaining orthographic views ;Projection of lines, angles and plane surfaces; analysis in three views</p> <p>7.4 Projection of curved lines and surfaces, object orientation and selection of views for best representation; full and hidden lines</p> <p>7.5 Orthographic Drawings; making an orthographic drawing, visualizing objects from the given views</p> <p>7.6 Interpretation of adjacent areas, true-length lines,</p>	12

	representation of holes, conventional practices	
L01, L02, L03 & L04	Unit VIII Sectional Views 8.1 Full Section 8.2 Half Section 8.3 Broken Section 8.4 Revolved Section 8.5 Removed (Detail) Section 8.6 Phantom or Hidden Section 8.7 Auxiliary Sectional views 8.8 Specifying Cutting Planes for Section 8.9 Conventions for hidden lines, holes	4
L01,L02,L03 & L04	Unit IX Developments and Intersections 9.1 Introduction and Projection of Solids 9.2 Developments: General Concepts and Practical Consideration; Developments of a right or oblique prism, cylinder, pyramid and cone ; Development of a truncated pyramid and cone; Triangulation method for approximately developed surfaces; Transition pieces for connecting different shapes; Development of a sphere 9.3 Intersections & Interpretation : (i) Lines of intersection of geometric surfaces (ii) Piercing point of a line and a geometric solid (iii) Intersection lines of two planes (iv) Intersection of prisms and pyramids (v) Intersection of a cylinder and an oblique plane (vi) Intersection of a sphere and an oblique plane (vii) Constructing a development using auxiliary views (viii) Intersection of two cylinders (ix) Intersection of a cylinder and a cone	12
L05	Unit X: Pictorial Projection 10.1 Introduction; Characteristics, advantages and disadvantages 10.2 Axonometric Projection; Isometric drawing, Dimetric and Trimetric drawing 10.3 Oblique Projection; Cabinet and Cavalier drawing 10.4 Perspective Projection; Parallel and Angular drawing	8

LABORATORY (60 hours for a group of maximum 24 students)

1. Freehand technical lettering and use of drawing instruments
2. Freehand technical lettering and use of drawing instruments (cont)
3. Dimensioning and Scaling
4. Applied geometrical drawing I
5. Applied geometrical drawing II
6. Descriptive geometry I

7. Descriptive geometry II
8. Descriptive geometry III
9. Projection and Multi view Drawing I
10. Projection and Multi view Drawing II
11. Sectional Views I
12. Sectional Views II
13. Developments of Surface I
14. Developments of Surface II
15. Effect of Intersections
16. Pictorial Projection

Recommended Books:

- Bhatt N.D. (2011) *Elementary Engineering drawing*, Charotar Publishing House.
- Dhawan, R.K. (2006). *A Text book of Engineering Drawing*. S. Chand and Company Limited, India.
- French T E., Vierck C.J. and Foster R.J (1981). *Engineering Drawing and Graphic Technology*, McGraw Hill.
- Luintel, M. C. *Engineering Drawing (Vol I)*, Athrai Publication (P) Limited.
- Luzadder W.J. (1981). *Fundamentals of Engineering Drawing*, Prentice Hall.

Method of Instruction

Lecture and Practical

Evaluation Approach

The evaluation of student performance shall be conducted in two distinct phases: Internal (Continuous) Assessment and Semester-End Examination. Student must pass the internal evaluation to qualify for the semester-end examination.

The Internal Evaluation will be carried out as a continuous assessment (CA) process throughout the semester. It will include a range of formative assessment components designed to measure both theoretical understanding and practical competence. The evaluation modalities may comprise unit tests, take-home assignments, class tests, quizzes, and viva-voce examinations, as deemed appropriate by the instructor.

The Semester-End Examination shall be a comprehensive written examination, aimed at evaluating the students' overall conceptual understanding, analytical ability, and problem-solving skills acquired during the course.

Evaluation	Marks	Approach	Marks
Internal evaluation	40 Marks	Assignment	6
		Attendance and Class Performance	4
		Unit Tests/ Internal	10

		Assessments	
		Drawing Sheet Evaluation	20
		Total Internal	40
Semester End Examination	60 Marks		60
	Total		100

Marks Distribution for End Semester Examination

Chapters/Units	Hours Allocated	Marks Distribution (Tentative)*
Unit I to IV	8	6
Unit V	6	6
Unit VI	10	10
Unit VII	12	12
Unit VIII	4	5
Unit IX	12	13
Unit X	8	8

* There may be minor deviation in marks distribution.



Far Western University

Faculty of Engineering

Course Title:	Computer Engineering Workshop	Course Code:	CT1106
Course Credit:	1 (1-0-1.5)	Year/Semester:	I/I
Level:	Undergraduate	Program:	Computer Engineering

Course Description

This course is designed for BE Computer Engineering students, covering essential hardware, software, operating systems, and networking concepts. It is specifically designed to build practical competency, allowing students to diagnose and resolve onboard computer hardware, software, and network issues. A key outcome is understanding the necessary hardware specifications for running various OS and applications.

General Objectives

The general objectives of the course are listed below.

- Develop a foundational understanding of computer hardware and network components, their functions, and system requirements.
- Build the ability to install, configure, and troubleshoot operating systems, software, and network-related issues.
- Enhance practical skills in assembling, maintaining, and diagnosing computer hardware and networking systems.
- Cultivate the competency required to work effectively with hardware, software, and networking environments in real-world scenarios.

Learning Outcome

After completing this course, students will be able to:

LO1: Identify and describe key computer hardware components, their functions, and compatibility requirements.

LO 2: Demonstrate the ability to install, configure, and manage operating systems, application software, and basic network settings.

LO 3: Diagnose and troubleshoot common hardware, software, and network problems using systematic techniques and tools.

LO 4: Assemble, maintain, and optimize computer systems and small networks following standard practices and safety procedures.

Contents

Learning Objectives	Content	Hrs.
LO 1	Unit 1: Introduction to Desktop/Workstation/laptop Assembly 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 cablings and Ports.	2
LO 1, LO 2	Unit 2: Assembling Desktop/Laptop Computer 2.1 Assembling Desktop 2.1.1 Assembling steps and precautions. 2.1.2 Setting of motherboards, memory, hard disk, processors, CDROM, SMPS and other devices. 2.2 Assembling Laptop 2.2.1 Assembling steps and precautions. 2.2.2 Demonstration of motherboards, memory, hard disk, processors, CDROM, SMPS and other devices.	4
LO 2,	Unit 3: Laptop/Desktop OS Installation 3.1 BIOS setting, firmware types, BOOT configuration. 3.2 Hard disc/ SSD partitioning. 3.3 OS installation (Linux, windows). 3.4 User account management 3.5 Printer, Scanner installation.	6
LO 2, LO 3	Unit 4: Server Installation and Backup 4.1 Introduction to server. 4.2 IP Address setting, Sharing of Printer/Device 4.3 Study of different server (Email, Data, Domain, FTP).	5
LO 2	Unit 4: Software Installation 5.1 Installation of application and utility software. 5.2 Update of firmware patches. 5.3 End-point Protection	5
LO 2, LO 3	Unit 6: Networking and Internet Setup 6.1 Introduction to Computer Network, Network topologies, wired and wireless networking media. 6.2 Network cabling, cable types and connectors. 6.3 Basic wireless AP configuration.	3
LO 4	Unit 7: Hardware and Software Troubleshooting 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.	5

Reference books

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.

Method of Instruction

Practical Laboratory

Evaluation Approach

The evaluation of student performance shall be conducted in two distinct phases: Internal (Continuous) Assessment and Semester-End Examination. Student must pass the internal evaluation to qualify for the semester-end examination. The Internal Evaluation will be carried out as a continuous assessment (CA) process throughout the semester. It will include a range of formative assessment components designed to measure both theoretical understanding and practical competence. The evaluation modalities may comprise unit tests, take-home assignments, class tests, quizzes, mini projects, presentations, and viva-voce examinations, as deemed appropriate by the instructor. The Semester-End Examination shall be a comprehensive written examination, aimed at evaluating the students' overall conceptual understanding, analytical ability, and problem-solving skills acquired during the course.

Evaluation	Marks	Approach	Marks
Practical Examination	40 Marks (Internal)	Practical Report	36
		Attendance	4
	60 Marks (External)	Practical Exam	40
		Viva	20
	Total		100