Far Western University
School of Engineering
Bachelor of Computer Engineering
(Course of Study)

Course Title: Basic Electrical Engineering **Credit: 3**
Course Code: **Number of periods per week: 3**
Nature of the Course: Theory + Practical **Total hours: 45**
Year: I, Semester: I
Level: B.E.
Degree: Bachelor's Degree in Computer Engineering

1. Course Introduction

This course introduces the concept of basic electrical engineering. It includes the basic circuit concepts of AC & DC, single phase and poly phase AC circuit, single phase transformers, power systems and electrical safety.

2. Objectives

After successfully completing the course activities, the student will be able to:

- Analyze electric circuits (AC & DC)
- Work on electrical instrumentation projects.
- Operate, distinguish and use electrical devices and transformers.
- Gain knowledge about the fundamentals of power systems, wiring and earthing.

3. 3. Specific Objectives and Contents

Specific Objectives	Contents
• To understand the basic concept of electricity and its role in the society.	**Unit I: Introduction (1 hr)** 1.1 Role of electricity in modern society 1.2 Energy sources and production 1.3 Consumption of electricity.
• To be familiar with DC Circuit. • To be familiar with different circuit elements and their characteristics. • To understand the concept of power and energy. • To be familiar with different types of sources.	**Unit II: DC Circuit Analysis (12 hrs)** 2.1 Circuits concepts (Lumped and distributed parameters) 2.2 Linear and non- linear parameter, passive and active circuits 2.3 Circuit elements (Resistance, Capacitance and Inductance), their properties and characteristics in a geometrical and hardware aspects, color coding 2.4 Series of parallel compilation of resistance, equivalent resistance and its calculation 2.5 Star-delta transformation 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

• To be familiar with Kirchoff's current and voltage laws. • To be familiar with different network theorems. • To understand the concept of single phase AC circuit. • To be familiar with the steady response of RL, RC and RLC series circuit. • To understand the concept of poly phase AC circuit. • To understand the concept of transformer and its operation. • To understand the basic electrical safety related things. • To be familiar with wiring and earthing. • To understand the concept of power systems.. • To understand the concept of generator and its applications. • To understand the operation of hydroplant.	2.11 Nodal Method and Mesh method of network analysis (without dependent source) 2.12 Network theorems (i.e. Superposition Thevenin's, Norton's), Maximum power transfer. **Unit III: Single Phase AC Circuit Analysis (10 hrs)** 3.1 Generation of EMF by electromagnetic induction 3.2 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 3.3 Phase algebra, power triangle, impedance triangle, steady state response of circuits (RL, RC, RLC series and parallel) and concept about admittance, impedance reactance and its triangle), instantaneous power, average real-power, reactive power, power factor and significance of power factor, resonance in series and parallel RLC circuit. bandwidth, effect of Q-factor in resonance. **Unit IV: Poly-Phase AC Circuit Analysis (6 hrs)** 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 measurement by single and two wattmeter method. **Unit V: Transformers (4 hrs)** 5.1 Ideal and practical transformer 5.2 EMF equation, equivalent circuit 5.3 Losses in transformers 5.4 Regulation and efficiency. **Unit VI: Electrical Safety and Wiring (5 hrs)** 6.1 Safety measures in electrical system 6.2 Types of wiring, wiring accessories 6.3 Staircase, fluorescent lamps and corridor wiring 6.4 Basic principles of earthing 6.5 Types of earthing **Unit VII: Introduction of Power System (4 hrs)** 7.1 general layout of electrical power system 7.2 generation, transmission & distribution of power. 7.3 Standard transmission and distribution voltages 7.4 Concept of grid. **Unit VIII. Case Study (3 hrs)**

	In this chapter students will study the operation of any existing hydropower plant of Nepal, prepare a report and present it.

Laboratory Work:

1. To measure current, voltage and power across the passive components.
2. To verify Kirchhoff's Current Law (KCL) & Kirchhoff's Voltage Law (KVL).
3. To verify Thevenin's Theorem.
4. To verify maximum power transfer theorem.
5. To verify superposition theorem.
6. To measure three phase power by using two wattmeter.
7. To determine efficiency and voltage regulation of a single-phase transformer by direct loading.
8. To study open circuits & short circuits tests on a single phase transformer.

Prescribed Text

1. *"Introduction of Electric circuit":*Albert Boylested, Prentice Hall of India Private Limited, New Delhi.
2. *"First Course in Electrical Engineering":* S.N. Tiwari, , att. Wheeler and Co. Ltd., Allabhad.

References

1. *"A Text Book of Electrical Technology":* B.L Theraja & A.K. Theraja, S. Chand Publication
2. "*Basic Electrical Engineering*": Mehta.V.K, Rohit Mehta, Chand. S & Co.
3. "*ABC of Electrical Engineering*": Jain & Jain
4. "*Basic Electrical Engineering*" : Kothari.D.P and Nagrath.I.J, Tata McGraw -Hill.

Far Western University

School of Engineering

Bachelor of Computer Engineering

(Course of Study)

Course Title: Engineering Physics	**Credit: 3**
Course Code:	**Number of lecture/week: 3**
Nature of the Course: Theory	**Tutorial/week:1**
Year/Semester: I/I	**Total hours: 45**

1. Course Description

The course intends to enable the students to be acquainted with the basic concepts and principles of physics with the present need and applications.

2. Course Objectives

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

- to provide the basic concept and knowledge of physics.
- to apply this knowledge base for studying major courses.

- to introduce the concepts and methods of mechanics and optics needed for application in various areas.
- to provide the basic concepts of electronic circuits.

Specific Objectives	**Contents**
• Understand the oscillations • Know the related relations and their use	**Oscillation: 4** Introduction, Types of mechanical oscillations (free, damped and forced), EM oscillation (types and examples only)
• Understand the combination of lenses • Know the cardinal points • Understand aberration	**Geometrical Optics 3** Lens, combination of lenses, cardinal points, chromatic aberration
• Understand the interference and formation of maxima and minima • Understand Newton's ring pattern and variation of their radii • Know the working of Michelson's interferometer • Understand the difference between interference and diffraction • Understand the distribution of energy by diffraction • Know the working and use of diffraction • Understand X-ray diffraction and their applications in crystallography • Understand the concept of double refraction, role of half and quarter wave plates • Understand optical activity and specific rotation	**Physical Optics (12)** **Interference:** Young's experiment, interference in thin films, Newton's rings, Michelson's interferometer **Diffraction:** Fresnel and Fraunhoffer's diffraction, Diffraction at a single slit, diffraction grating, X-ray diffraction and its use in solids **Polarization:** Double refraction, Nichol prism, half wave and quarter wave plates, optical activity and specific rotation
• Understand the principles of laser and know their applications • Know the construction and working of He-Ne laser • Know the principle and applications optical fibre	**Laser and Fibre Optics (3)** Principles and uses of laser, He-Ne laser, optical fibre and its applications
• Understand coulomb's law • Understand the concepts of electric field and potential • Understand the principle of capacitor and the role of dielectric • Know charging and discharging of capacitors	**Electrostatics (6)** Coubomb's law, electric field and potential, capacitors, capacitors with dielectric, charging and discharging of capacitors
• Understand Ohm's law. • Know the difference between semiconductors and superconductors	**Electromagnetism (10)**

• Understand the force and torque due to magnetic field • Understand electromagnetic induction, self inductance and mutual inductance • Understand Maxwell's equations • Know equation of continuity	Ohm's law, semiconductors and superconductors, magnetic force and torque, Faraday' laws, Induction and energy transformation, induced field, LCR circuits. Maxwell's equations, E and B fields, continuity equation.
• Understand types and properties of different waves • Understand the concept of energy quantization • Understand Schrodinger wave equation • Develop the concept of barrier tunnel and potential well	**Matter waves and Energy (6)** Waves, electron and matter waves, quantization of energy, Schrodinger wave equation, Probability distribution, one dimensional potential well, barrier tunneling.
• To understand the band theory and types of semiconductor. • understand the biasing of diodes and transistors, their characteristics • understand the function of FET • understand different logic gates	**Electronics (6)** Types of semiconductor, Diodes, Bipolar Transistor (BJT), Field effect transistor (FET), Logic gates, RTL and TTL gates, Memory circuits.

Prescribed Text

Physics (Part I and II): Robert Resnick and David Halliday, Wiley Eastern Limited

References

1. *Fundamentals of Physics*: Haliday, Resnick and Walker, John Wiley and Sons
2. *Modern Engineering Physics:* A. S. Vasudeva, S. Chand & Co
3. *A Text Book of Optics: Brij Lal and* Subramanyam, S. Chand & Co
4. *Optics:*A. K. Ghatak, Tata Mc-Graw Hill
5. *Engineering Physics:* R.K Gaur and S.L. Gupta, Dhanpat Publisher
6. *Electronic Principles*, 7th ed., A. P. Malvino, Tata McGraw Hill Publishing House, New Delhi
7. *Modern Digital Electronics*, 2nd ed., R. P. Jain, Tata McGraw Hill Publishing House, New Delhi.

Practical

1. To determination the acceleration due to gravity and radius of gyration of a bar pendulum.
2. To verify Hooke's law and determine Young's modulus of a material given by bending beam method.
3. To determine the refractive index of material of given prism using spectrometer.
4. To determine wavelength of sodium light by Newton's rings.
5. To determine the specific rotation of sugar solution using polarimeter.
6. To determine wavelength of given light (He-ne laser light) and thickness of a material by diffraction method.
7. To determine the capacitance of a capacitor by charging and discharging through a resistor.
8. To study a relation between current and frequency in an LCR series circuit, also find the resonant frequency and quality factor.

9. To determine the dielectric constant of a given substance and study its variation with frequency by resonance method.
10. To determine the susceptibility of a solution of given material by quinces method.
11. To study the electric field mapping.
12. To construct and verify truth tables of different gates (AND, OR, NOT, NAND, NOR, EX-OR).

Far Western University

School of Engineering

Bachelor of Computer Engineering

(Course of Study)

Course Title: Engineering Drawing	**Credit: 2**
Course Code:AR111	**Number of Periods Per week: 1T+ 3P=4**
Nature of the Course: Theory + Practical	**Practical Assignments Per week: at least 1**
Year/Semester: I/I	**Total hours: 15+45**

1. Course Introduction:

The course intends to enable the students to be acquainted with the basic concepts and principles of drawing. Students will be familiarized with the fundamentals of drawing, instruments, symbols, conventions and current practices of different types of drawings.

2. Objectives:

To develop basic concept of projection with reference to points, lines, planes and geometrical solids and enhance the skills of engineering graphic technology to the students. It also aims to develop sketching and drafting skill to facilitate communication.

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

- To acquire sufficient knowledge of drafting
- To apply knowledge for studying major courses in BE

3. Specific Objectives and Contents

Specific Objectives	Contents
• Use of different instruments to draw technical drawing	**Unit I: Instrumental Drawing; Practices & Techniques 2 (hrs)** 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.
• Practice of free hand writing letters and numbers.	**Unit II: Freehand Technical lettering 2(hrs)** 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

• Use of dimension technique and dimension conventions	**Unit III: Dimensioning** **2(hrs)** 3.1 Fundamentals and techniques; Size and location dimensioning ; measurement units; SI conventions 3.2 General dimensioning practices; placement of dimensions; aligned and unidirectional
• Types of scale • Application of scale and	**Unit IV: Engineering Scale:** **2(hrs)** 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
• Enhance skills and technique in 2D and 3D geometry • Applications of conic sections, space curves, and other engineering curves • Generate ideas about solids.	**Unit V Applied Geometry** **6 (Hrs)** 5.1 Plane Geometrical construction; Bisecting and trisecting lines and angles, proportional division of lines, construction of angles, triangles, squares, and polygons. Construction using tangents and circular arcs 5.2 Methods of drawing standard curves such as ellipses, parabolas, hyperbolas, involutes, spirals, cycloid, helices (cylindrical and conical). 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
• Explain the history of Descriptive Geometry • Understand the way of locating point, line, plane and solid in space • Develop idea of solving geometry when given verbally. • Calculate angle and length of lines and planes when they are in space	**Unit VI Basic Descriptive Geometry** **12 (Hrs.)** 6.1 Introduction: Application of descriptive geometry, principles to the solution of problems involving positioning of objects in three-dimensional space 6.2 The projection of points, lines, planes and solid in space 6.3 Projection of Solids Placed in different positions, 6.4 Parallel Lines 6.5 True Length of Lines; horizontal , inclined and oblique lines 6.6 Perpendicular Lines 6.7 Bearing of a Line 6.8 Point view or End View of a Line 6.9 Shortest Distance from a point to a Line 6.10 Principal Lines of a plane 6.11 Edge View of a plane 6.12 True shape of an Oblique plane 6.13 Intersection of a Line and a plane 6.14 Angle Between a Line and a plane 6.15 Angle Between Two Intersecting Lines 6.16 Angle Between Two Non- Intersecting (Skew) lines 6.17 Angle between two planes 6.18 Shortest Distance Between Two Skew Lines

• Understand the classification projection • Learn the symbol of projection • Understand the process of changing 3D figure into 2D figure • Learn the idea of hidden lines for unseen parts	**Unit VII Theory of Projection and Multi view (Orthographic) Projection Drawing 12 (hrs)** 7.1 Common types of projections – Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection 7.2 System of orthographic projection: First angle projection and Third angle projection 7.3 Principal Views; Methods for obtaining orthographic views ;Projection of lines, angles and plane surfaces; analysis in three views 7.4 Projection of curved lines and surfaces, object orientation and selection of views for best representation; full and hidden lines 7.5 Orthographic Drawings; making an orthographic drawing, visualizing objects from the given views 7.6 Interpretation of adjacent areas, true-length lines, representation of holes, conventional practices
• Develop the concept of cutting solids by an imaginary cutting plane and revealing the unseen parts from the solid • Use of section lines • Conventions for hidden lines, holes, ribs, spokes	**Unit VIII Sectional Views 4 (Hrs.)** 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
• Develop the concept of development of outer surface of solids • Develop an idea of penetration of solids into planes • Understand the process of generation of curves on the surface of when different solids get intersected / penetrated	**Unit IX Developments and Intersections 18(Hrs.)** 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

LABORATORY

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 I
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

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.

Course Title: Engineering Mathematics I	**Credit: 3**
Course Code.:	**Number of lecture/week: 4**
Nature of the Course: Theory	**Tutorial/week: 2**
Year/Semester: First/First	**Total hours: 45**

Course Objective:

The basic objective of the course is to provide a sound knowledge of differential calculus, integral calculus, two dimensional analytical geometry and vector algebra. After learning the course one may enhance the fundamental concepts on Mathematics and able to study the further courses of the subject which are more applicable in Engineering. Detail of the course is as follows:

Course Contents:

Part 1(Differential Calculus)

1.1 Higher Order Derivative:Review of limit, continuity and derivative. Successive differentiation of some special functions, higher order derivative and Leibnitz rule for derivative of product of two functions. (4 hrs.)

1.2 Mean Value Theorems: Rolle's Theorem and Lagrange's Mean Value Theorem (Statement and proof), their geometry and applications. Cauchy Mean Value Theorem (statement and proof) with applications. Taylor's and Maclaurin's infinite series for real valued functions (without derivation) with examples. (5 hrs.)

1.3 Indeterminate forms: L' Hospital rule and its application to evaluate the limit of a function.

(2 hrs.)

1.4 Asymptotes: Types (horizontal, vertical and oblique) and equation of asymptotes to the curve represented by algebraic polynomial equations (2 hrs.)

1.5 Curvature: concept of curvature and its radius. Radius of curvature of Cartesian, polar, parametric and pedal curves. (2 hrs.)

Part 2 (Integral Calculus)

2.1 Indefinite Integrals: Evaluation of indefinite integrals by using standard methods (methods of substitution, partial fraction and integration by parts)(3 hrs)

2.2Definite Integrals: Definite integral with properties.(3 hrs)

2.3 Beta-Gamma function and Reduction formulae. (3 hrs.)

2.4 Integration by summation method of some standard functions (2 hrs.)

2.5 Improper integrals and Cauchy principal value. (2 hrs.)

2.6 Techniques of curve sketching (Cartesian and polar form) (2 hrs)

2.7 Application of integration: Arc length, Area between curves, Volume of solid of revolution. (3 hrs.)

Part 3(Two Dimensional Analytical Geometry)

3.1 Review of Standard equation of parabola, ellipse and hyperbola in Cartesian form, equation of tangent and normal to those curves and problems related to tangent and normal only. (4 hrs.)

3.2 polar equation of conic section and their classification in terms of eccentricity. (2 hrs.)

Part 4(Vector Algebra)

4.1 Review of scalar and vector product of two vectors and their geometrical interpretation.

(1 hr.)

4.2 Scalar product of three and four vectors and their geometrical interpretation with properties. (2 hrs.)

4.3 Vector product of three and four vectors, Reciprocal system of vectors of three non-coplanar vectors. (3 hrs.)

References Books

1. E.Kreyszig, *Advanced Engineering mathematics*, Wiley- Eastern,Publication.
2. N. P. Bali, Dr. Manish Goyal, *A text book of engineering mathematics,* Laxmi Publication (P). LTD.
3. Thomas George B. and Finney. Ross L. ,*Calculus and Analytical Geometry*, Pearson Education

Far Western University
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(Course of Study)

Course Title: Computer Programming **Credit: 3**
Course Code: CT 115 **Number of lecture/week: 3**
Year/Semester: First/First **Tutorial/week: 1**
Level: Bachelor of Engineering (Computer) **Total hours: 45**

Course Objective: To acquaint the student with computer software and high level programming languages. Emphasis will be given on developing computer programming skills using C.

Course Outline:

Specific Objectives	Contents (UNIT/CHAPTER)	Duration
	1. Introduction to Programming 1.1. Computer software 1.2. Classification of Computer software 1.4. Generation of programming languages 1.5. Categorization of high level languages	(2 hours)
	2. Problem solving using Computer 2.1. Problem analysis 2.2. Algorithm development and Flowchart 2.3. Compilation and Execution 2.4. Debugging and Testing 2.5. Programming Documentation	(2 hours)
	3. Introduction to C 3.1. Introduction 3.2. Structure of C Program 3.3. Character set, Keywords, and Identifiers 3.4. Data types in C 3.5. Preprocessor Directives 3.6. Constants and Variables 3.7. Operators in C 3.8. Statements and Expressions 3.9. Type Conversion and Type Casting	(4 hours)
	4. Input and Output 4.1. Unformatted input/output 4.2. Formatted input/output 4.3. Programs using input/output statements	(2 hours)
	5. Decision/Control statements and looping statements 5.1. Introduction 5.2. The ***goto, if, if … … else, switch*** statements 5.3. The ***while, do … while, for*** statements 5.4. Nested loops	(6 hours)

	5.5. Break and Continue Statements	
	6. Functions 6.1. Introduction 6.2. Types of function 6.3. Function Prototypes 6.4. Function definition and return statement 6.5. Function invocation 6.6. Passing Parameters to the function 6.7. Recursive Functions	(6 hours)
	7. Arrays and Strings 7.1. Defining an Array 7.2. Accessing Array Elements 7.3. One-dimensional Arrays 7.4. Multi-dimensional Arrays 7.5. Strings and string manipulation 7.6. Passing Array and String to function	(8 hours)
	8. Structures 8.1. Introduction 8.2. Processing a Structure 8.3. Arrays of Structures 8.4. Arrays within Structures 8.5. Structures and Function 8.6. Self Referential Structures	(5 hours)
	9. Pointers 9.1. Introduction 9.2. Pointer declaration 9.3. Pointer arithmetic 9.4. Pointer and Array 9.5. Passing Pointers to a Function 9.6. Pointers and Strings 9.7. Dynamic Memory Allocation	(5 hours)
	10. Data Files 10.1. Defining opening and closing a file 10.2. Input/Output operations on Files 10.3. Error handling during input/output operations	(5 hours)

Project work:

Students must submit mini project at the end of course

Tutorials:

A number of tutorial assignments can be given for fluency in programming.

Practical:

Minimum 12 sets of computer programs in C

References:

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

Evaluation scheme:

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Unit / Chapter	Hours	Marks Distribution* (Tentative)
1	2	2
2	2	3
3	4	5
4	2	3
5	6	8
6	6	8
7	8	10
8	5	7
9	5	7
10	5	7

* There may be minor variation in marks distribution.

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)

Far Western University

School of Engineering

Bachelor of Computer Engineering

(Course of Study)

Course Title: Workshop Technology	**Credit: 1**
Course Code.:	**Number of lecture/week: 1**
Nature of the Course: Theory	**Tutorial/week: 3**
Year/Semester: I/I	**Total hours: 15**

1. Course description:

This subject deals with the identification, uses and care of basic hand tools, measuring instrument, power tools, imparting knowledge and skill in the field of mechanical engineering and apply safety precautions in mechanical work while manufacturing simple metal components and articles.

2. Course Objectives:

Make the students familiar with theoretical and applied field of mechanical engineering to:

1. Apply the safety rules in the workshop.
2. Identify the tools, measuring instrument and power tools.
3. Joining the metal by different processes by hand.
4. Maintenance and care of the measuring instrument, hand tools and power tools.
5. Operate various machine tools for producing simple metal components and articles
6. Acquire knowledge and practice on foundry, forging and welding

Evaluation

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

3. Specific Objectives and Contents

Specific Objectives	**Contents**
➢ Basic introduction and on various workshop tools	**Unit I: General safety Considerations (2 hrs)**
➢ Knowledge of safety requirements during handling of various workshop tools.	Introduction and general safety considerations during handling of Bench Tools, Hammers, Screw Drivers, Punches, Chisels, Scrapers, Scribers, Files, Pliers and Cutters, Wrenches, Hacksaw, Bench Vice, Hand drill, Taps and Dies, Hand Shears, Rules, Tapes and Squares, Soldering Iron, Rivets.
➢ Introduction to hand working operations Soldering,	**Unit II: Hand Working Operations (1 hr)** Brief introduction on various hand working operations - Sawing, Filing, Threading, Scribing, Shearing, Riveting.
➢ Familiar with various measuring and gauging tools.	**Unit III: Measuring and Gauging(1 hr)** Introduction

Semi – Precision Tools – Calipers, depth Gauge, Feeler Gauge
Precision Tools– Micrometers, Vernier Calipers, Vernier Height Gauge, Telescopic Gauge, Hole Gauge, Bevel Protractor, Dial Indicator, Gauge Blocks and Surface Plate

- Familiar with drills and drilling processes

Unit IV: Drills and Drilling Processes (1 hr)
Types of drilling machines, Work holding devices and accessories, Cutting tools, Geometry of Drill Bits, Grinding of Drill Bits, Operations- Drilling, Counter-boring, Counter-sinking, Reaming, Honing, Lapping, Cutting speeds, Drilling safety.

- Able to perform various machining operations.

Unit V: Machine Tools (4 hours)
General safety considerations, Introduction: Engine Lathes, Physical Construction, Types and operation of Lathe Machine- Facing, Turning, Threading
Shapers: Introduction, Types and Physical Construction of Shapers, General Applications
Milling machine: Introduction and Types of Milling machine, Physical construction, Milling cutters- Plain, Side, Angle, End, Form. Work holding devices, Cutter holding devices.
Grinding Machines: Abrasives, Bonds, Grinding wheels. Round Grinders- Portable grinders, Bench Grinders, Swing Frame Grinders, Abrasive Belt Grinders and Precision Grinder-Cylindrical grinders and Surface Grinders

- Knowledge of different metals and their use as tool material
- Knowledge of various heat treatment processes and their operation.

Unit VI: Material Properties (2 hours)
Tool materials- Low, medium and high carbon steels, hot and cold rolled steels, Alloy steels, Carbide and Ceramic materials.
Heat treating methods for steels- Annealing, Tempering, Normalizing, Hardening and Quenching
Non-ferrous metals- Brass, Bronze, Aluminum- Comparative properties

- Familiar with sheet metal tools and sheet metal works.
- Able to perform sheet metal operations-

Unit VII: Sheet Metal Works(1 hr)
Introduction to sheet metal works and sheet metal tools, Marking and Layout Operations and sheet metal Bending, Cutting, Rolling

- Familiar with foundry tools and foundry practice.
- Able to perform foundry operation Pattern making, Core Making, Melting Furnace- Cupola and Sand Casting Process

Unit VIII: Foundry Practice(1 hr)
Introduction to foundry tools and foundry process,

- Familiar with forging tools and forging practice.

Unit IX: Forging Practice (1hr)

➢ Able to perform forging operation.	Introduction to forging tools- Forging Presses and Hammers, Forging operations- Upsetting, Drawing, Cutting, Bending, Punching
➢ Familiar with various types of metal joining process ➢ Able to perform soldering, brazing, gas welding	**Unit X: Metal Joining(1 hr)** Safety considerations and introduction to Soldering, Brazing and Welding- Gas Welding, Arc Welding, Resistance Welding, Tungsten Gas Welding(TIG), Metal Inert Gas Welding(MIG)

References

1. "Shop Theory", J. Anderson and E. E. Tatro, McGraw – Hill, 5th Edition, 1942

2. "Machine shop operations and setups", O. D. Lascoe, C. A. Nelson and H. W. Porter, American Technical society, 1973

3. "Machine shop Practice – Vol. I" , Industrial Press, New York, 1971

4. "Machine shop Practice – Vol. I" , Industrial Press, New York, 1971

5. " Technology of Machine Tools", Mc Graw Hill – Ryerson, 3rd Edition

6. "Machinery's Handbook", Oberg, Jones and Horton, 23rd Edition, Industrial Press, New York.

7. "Elements of Workshop Technology – Vol. I (Manufacturing Processes)" – S. K. Hajra Choudhury and A. K. Hajra Choudhury – Media Promoters and Publishers Pvt. Ltd. , Bombay, INDIA, Tenth Edition, 1993

8. "Elements of Workshop Technology – Vol. II: (Machine Tools)" – S. K. Hajra Choudhury, S. K. Bose and A. K. Hajra Choudhury – Media Promoters and Publishers Pvt. Ltd. , Bombay, INDIA, Eight Edition, 1988

9. "A Course in Workshop Technology – Vol. I" – Prof. B. S. Raghuwanshi – Dhanpat Rai and Co. (P) Ltd, Delhi, INDIA, Ninth Edition, 2002

10. "A Course in Workshop Technology – Vol. II" – Prof. B. S. Raghuwanshi – Dhanpat Rai and Co. (P) Ltd, Delhi, INDIA, Ninth Edition, 2002

11. "Workshop Technology – Vol. I" – H. S. Bawa – Tata Mc – Graw Hill publishing company Limited, New Delhi, INDIA,

12. "Workshop Technology – Vol. II" – H. S. Bawa – Tata Mc – Graw Hill publishing company Limited, New Delhi, INDIA,

A text book of Workshop Technology – R. S. Khurmi and J. K. Gupta – S. Chand and Company Ltd, New Delhi. India

Workshop Practice: 3 hours/week; 15 weeks

Bench Tools and hand operations: Measuring, Marking, Layout, Cutting, Filling, Drilling, Tapping, Assembly

1. Bench Tools and hand operations: (Contd.)

2. Drilling machines

3. Measuring and Gauging Instruments

4. Engine lathe: Basic operations such as Plain turning, facing, cutting off, knurling.

5. Engine lathe: Taper turning, drilling and boring

6. Basic Shaper Operations

7. Milling Machines

8. Grinding Machines

9. Sheet Metal works

10. Foundry Practice

11. Forging Practice

12. Electric Arc Welding

13. Gas Welding