# Applied Mechanics

Course Title: Applied Mechanics
Course code: CE 116
Nature of the course: Theory
Year: First, Semester: First
Level: BE (Civil)

Number of the lecture per week: 3
Tutorial/ week: 3 hour
Total hour: 45

## 1. Course Introduction:

The course is aimed to preparing students to understand the fundamentals of mechanics. It intends to enable the students to be acquainted with the basic concepts and principles of applied mechanics. Students will be familiarized with the fundamentals of forces, centroid and MOI, analysis of structure. the second part entails the principles of motion as applied to particles and rigid body dynamics.

## 2. Course Objectives:

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

- Acquire sufficient basic knowledge in applied mechanics
- Apply this knowledge base for studying major course in structure analysis and design
- Introduce the concepts and methods of mechanics needed for application in various branch of engineering problems.

## 3. Specific objectives and Concepts:

| Specific Objectives | Contents |
|---|---|
| • Realize the scope of mechanics<br>• Learn various branches of mechanics and distinguish between particle and rigid body<br>• Learn to draw free body diagram in solving in solving mechanics problems<br>• | **Unit I: Introduction (3 Hours)**<br>Definition and scope of mechanics, concepts of particles, rigid body, deformed and fluid bodies, equation of static free body diagram( Definition and examples), system of units. |
| • Understand the characteristics of force.<br>• Lear to resolve forces.<br>• Understand the moment and couple of forces and their resolution. | **Unit II Forces (6 hours)**<br>Definition and principle of forces, types of forces, principle of transmissibility & its limitations, resolution & composition of forces, moment of forces about a point and axes, theory of couples, resolution of forces into forces & couple & vice versa, resolution of system of forces. |
| • Distinguish between CG and Centroid.<br>• Compute centroid of different plane figures<br>• Compute moment of inertia of plane | **Unit III : Distributed Forces (5 hours)**<br>Definition & derivation of center gravity, Centroid of lines areas and volumnes. Definition of second moment of area & radius of gyration, |

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| figures and composite figures. | MOI of common figures, parallel and perpendicular axis theorems, MOI of built up section and MOI by direct integration. |
| • Understand Truss as a structural member.<br>• Determine determinacy of trusses.<br>• Analyze plane trusses by the method of joints and sections. | **Unit IV : Analysis of Plane Trusses (4 hours)**<br>Definition of a Truss, types of trusses, determinacy and stability, analysis of trusses by the method of joints, analysis of trusses by the methods of section. |
| • Understand Beam as a structure.<br>• Learn various forces developed in beams.<br>• Analyze member forces in beam with sketch | **Unit V : Analysis of Beams (5 hours)**<br>Definition and types of Beams, external and internal forces in beam.<br>Definition of sign convention of axial force, shear force and bending moment, relation between load, shear force and bending moment, Axial force, shear force and bending moment diagrams. |
| • Understand development friction<br>• Learn characteristics of friction<br>• Apply this knowledge to analyze practical problems. | **Unit VI : Friction (3 hours)**<br>Introduction (definition, types, causes & effects), Laws of dry friction, coefficient and angle of friction, condition of sliding or tipping, application to static problems. |
| • Understand the concept of dynamic as applied to particle.<br>• Determine the motion of particle.<br>• Develop equation of motion for different cases. | **Unit VII :Kinematics of particles (3 hours)**<br>Introduction to dynamics, rectilinear motion of particles, position, velocity and acceleration of a particle determination of motion of particle, uniform rectilinear motion of particles, uniformly accelerated rectilinear motion of particles. |
| • Define motion of particle along a curved path.<br>• Resolve velocity and acceleration.<br>• Derive equation of motion for n-t and r-$\theta$ coordinate | **Unit VIII : Curvilinear Motion (3 hours)**<br>Curvilinear motion of a particle, position, velocity and acceleration of a particle, rectangular components of velocity and acceleration, introduction of tangential and normal components, radial and transverse components. |
| • Define Newton's law as applied to particle.<br>• Derive momentum equations and apply work energy principle.<br>• Explain impulsive impact and apply principle of impulse and momentum to solve collision problems. | **Unit IX : System of Particles (7 hours)**<br>Newton's Second Law of motion, Dynamic equilibrium, Linear and angular momentum : rate of change and conservation, Kinetic energy of particles, Principle of work & energy application, impulsive motion and impact, central impact (direct and oblique) |
| • Introduce & Define Kinematics of Rigid body.<br>• Get idea about translation, rotation, | **Unit X : Introduction to rigid body motion (7 hours)**<br>Kinematics of Rigid body: Introduction, translation, rotation, general plane motion, kinetics of rigid body: equation of motion, |

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| general plane motion<br>• Define Kinetics of Rigid body, equation of motion, linear and angular momentum in plane motion & conservation<br>• to Know principle of work & energy application . | linear and angular momentum in plane motion & conservation, principle of work & energy application |

## Evaluation System

| Undergraduate Programs | | | | |
|---|---|---|---|---|
| **External Evaluation** | **Marks** | **Internal Evaluation** | **Weight age** | **Marks** |
| End semester examination (Details are given in the separate table at the end) | 60 | Assignments | 10% | 40 |
| | | Quizzes | 10% | |
| | | Attendance | 10% | |
| | | Presentation | 10% | |
| | | Mid-Term & Pre-board exam | 50% | |
| | | Group work | 10% | |
| Total External | 60 | Total Internal | 100% | 40 |

### External evaluation

#### End semester examination

It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following grid.

Full Marks: 100, Pass Marks: 45, Time: 3 Hrs

| Nature of question | Total questions to be asked | Total questions to be answered | Total marks | Weightage | External exam marks |
|---|---|---|---|---|---|
| Group A: multiple choice* | 20 | 20 | 20×1 = 20 | 20% | 12 |
| Group B: Short answer type questions | 8 | 6 | 6×8 = 48 | 40% | 24 |
| Group C: Long answer type question | 3 | 2 | 2×16 =32 | 40% | 24 |
| | | | 100 | 100% | 60 |

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

#### Internal evaluation

**Assignment:** Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

**Quizzes:** Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

**Attendance in class:** Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination.

Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

**Presentation:** Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

**Mid-term & Pre-board examination:** These are written examination and the questions will be asked covering all the topics in the session of the course.

**Discussion and participation**: Students will be evaluated on the basis of their active participation in the classroom discussions.

**Instructional Techniques:** All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Assignments
- Presentation by Students
- Term Paper writing
- Case study
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period.

## Prescribed Text:

1. *"vector Mechanics for Engineers- statics and Dynamics", F.P. Beer and E.R.* Jonsion, Jr. 6e, Mc Graw-Hill Book Co., New York, USA, 1987

## References:

2. *"Engineering mechanics-statics and Dynamics",* A. Mc Graw-Hill Book Co., New York, USA, 198

Far Western University

**Faculty of Engineering**

Mahendranagar, Kanchanpur

**Course Title: Basic Programming and Data Structure (C)** **Credit: 3**

**Course No: CT114** **Number of period per week: 3**

**Nature of the Course: Theory + Practical** **Total hours: 45**

**Year: First, Semester: First** **Level: B.E. Civil**

**Degree: Bachelors Degree in Civil Engineering**

**1. Course Introduction**

This course aims to provide introductory understanding of the various IT and programming tools used for software development. The course will also help the student to enhance their logical and analytical skill , since learning to write a program is totally logical and analytical. The course will help them to increase their problem solving skill. This course is an in-depth course designed to provide the basic concept of computer programming. The course begins from the basic terminologies used in computer such as definition of computer, input output devices, computer memories, Computer Programming and so on. The course is expanded to different aspects of programming languages, such as machine language, Assembly language, high level language, 4th generation language and so on.

**2. Objectives**

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

- Know the functionality (Hardware & software) of computer
- Know the hardware and software architecture of computer
- Write algorithm & draw the flowchart for any task and operation
- Understand the importance of programming in engineering field.
- Know the functioning of software company
- Use different techniques to write a program
- learn to use different control structures (conditional structure, loop control structure etc)
- Learn the concept of Array, function, string, structure, pointer and file handling. These are the strong features of c language.
- Learn the concept and use of different data structures.

**3. Specific Objectives and Contents**

| Specific Objectives | Contents |
|---|---|
| • To understand the basic concept and functionalities of a computer system. | **Unit I: Computer Fundamentals (2 hrs)** Introduction, Characteristics of Computer, Application of Computer, Basic Organization of Computer System, Input Unit, Processing Unit, Storage Unit, Output Unit, Computer Hardware, Computer Software, Types of Computer Software., |
| • To develop the skill to solve a | **Unit II: Program Designing Tools (2 hrs)** |

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| problem using different tools.<br>• Understand the use of algorithm, flow chart and pseudo code in programming. | Algorithm, Advantages and Limitations of an Algorithm, Sample Examples,<br>Flow Chart, Advantages and Limitations of a flowchart, Symbols used in a flow chart, Sample Examples<br>Pseudo code, Advantages and Limitations of Pseudo code, Sample Examples. |
| • To be familiar with various aspects of a programming language such as syntax, semantics, errors etc.<br>• To gain the knowledge of different language translators. | **Unit III: Basic Concept of Programming Language (4hrs)**<br>Machine Language, Advantages and Limitation of Machine Language<br>Assembly Language, Advantages and Limitations of Assembly Language<br>High Level Language, Advantages and Limitations of High Level Language, Examples of Different High Level Languages (FORTRAN, COBOL, BASIC, PASCAL, C)<br>Syntax and Semantics of a Language, Source Program and Object Program, Language Translators ( Compiler, Assembler and Interpreter), Testing and Debugging a Program, Program Design Techniques (Structured Programming Concept and Modular Programming Concept), Procedure Oriented Programming System (POPS) and Object Oriented Programming System (OOPS), Compilation Process, ASCII |
| • To know the basic and essential parts of C programming<br>• Understand detail of data type operators and statements<br>• Understand to write simple programs | **Unit IV: C Fundamentals (6 hrs)**<br>Character set of C, Variables, Constants, Identifiers, Rules for Declaring an Identifier, Key words, Data types, Enumerated Data type, typedef, typecasting, Delimeters, Operator in C (Arithmetic, Assignment, Comma, Increment, Decrement, Relational, Logical, address of, size of, ternary operator), Hierarchy- Precedence and Associatively of Operators<br>Statements( Executable and Non- Executable Statements), Comments<br>Basic Structure of a C Program, Pre- processor Directive, Input/ Output Functions, Format Specifiers, Field width Specifiers, Escape Sequences<br>Programming Examples |
| • To know the details of decision making statements<br>• Learn to handle the conditional statements<br>To know the similarities and differences between if and switch statements | **Unit V: Decision Control Structure (3hrs)**<br>Introduction, If statement, Nested if statement, if else statement, nested if else statement, use of logical operators, switch statements, comparison of if and switch statements, Programming examples |
| • Understand the details of implementing loop in a program<br>• Understand the different types of Loops | **Unit VI: Loop Control Structure (4 hrs)**<br>Introduction, Need of Looping, Types of Loop Statements (for, while, do while), Nesting of Loops, Break and Continue statement, Finite and infinite loops, Programming examples |

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| • Know about handling of arrays and strings<br>• Knowledge to group and handle set of similar data | **Unit VII: Arrays and Strings (5 hrs)**<br>Introduction, Dimension of Array, 1D Array Declaration, 1D Array Initialization, 1D Array input, 1D Array output<br>2D Array Declaration, 2D Array initialization, 2D Array input/output<br>String, String initialization String input/output, String Manipulation, 2D Array of String, Programming Examples |
| • Know about handling of pointer<br>• Know the importance of pointer<br>• Know the relation of pointer to array and string | **Unit VIII: Pointer (5 hrs)**<br>Introduction, void pointer, null pointer, pointer constants, pointer variable, pointer arithmetic, 1D array& pointer, 2D array& pointer, pointer& strings, chain of pointer, application of pointer, Programming examples |
| • Know about handling of structures<br>• Learn to group and handle set of dissimilar data in C programming | **Unit IX: Structure and Union (3 hrs)**<br>Introduction, Accessing members of structure variable, Structure input/output, initializing a structure variable, array of structure, nesting of structure, pointer of structure variable<br>Introduction to union, Programming examples |
| • Know about handling of user defined function<br>• Learn about components of function<br>• Learn about call by value and call by reference<br>• Learn about recursion | **Unit X: Function (5 hrs)**<br>Introduction, Components of a function program, function definition, function call, function proto type, actual arguments, formal arguments, return types, call by value, call by reference, passing both value and address, passing 1D and 2D array to a function, passing structure to a function , recursion, macro, storage classes, advantages of using a function<br>Programming examples |
| • Learn importance of file<br>• Learn to write data to a file and read data from a file | **Unit XI: File Input Output (4 hrs)**<br>Introduction, File pointer, opening a file, modes of opening the file, file input/output operations, random access to a file<br>Programming examples |
| Learn fundamentals of data structure | **Unit XII: Introduction to Data Structures (2 hrs)**<br>Introduction, need of a data structure, types of data structures, over view of various data structures: array, stack, queue, linked lists, tree, graphs |

**Prescribed Text**

Programming in C: V Rajaraman, PHI Publication, 2009 Edition
Programming in C: E Balagurusamy, Tata Mc-Graw Hill Publication, 6th Edition
A Text Book of C Programming: Karn & Mahato, Bench Mark Publication, 1st Edition

**Reference**

Data Structure using C: Aaron M. Tenenbaum, Yediclyah Langsam, Augenstein, Pearson Education Publication, 7th Edition 2009

Let us C: Yeswant Kanetkar, BPB Publication
Programming with C: Byron S Gottfried, Tata Mc-Graw Hill Publication, 3rd Edition
A book on C: A L Kelley, Ira Pohl, Pearson Education Publication, 4th Edition

**Course Title:** Basic Programming and Data Structure Practical
**Nature of the Course:** Practical
**Year: First, Semester: First**
**Level: BE Civil**
**Degree: Bachelor's Degree in Civil Engineering**

**Credit: 1**
**Number of hours per week:**
**(2 hrX3times or 3 hr x 2 times) 6**

**Objectives:** By the end of the course the student should be able to:

- Write simple and complex programs
- Develop application programs
- Know the syntax and semantics of C language
- Identify and eliminate the syntax and semantic errors
- Effectively use concept of decision control structure
- Effectively use concept of loop control structure
- Effectively use concept of arrays and strings
- Effectively use concept of pointers
- Effectively use concept of structure
- Effectively use concept of function
- Effectively use concept of file I/O

**Laboratory Works:**

Sufficient programming examples from each of specified chapters

**Books:**

- *Programming in C*: V Rajaraman, PHI Publication
- *Programming in C*: E Balagurusamy, Tata Mc-Graw Hill Publication, 6th Edition
- *A Text Book of C Programming:* Karn & Mahato, Bench Mark Publication, 1st Edition

Far Western University

# Faculty of Engineering

Mahendranagar, Kanchanpur

Course Title: Engineering Chemistry
Course No.: SH112
Nature of the Course: Theory
Level: B.E.
Year: First
Semester: First

Credit: **3**
Number of hours per week: **3**
Total hours: **45**

## 1. Course Description

The course intends to enable the students to be acquainted with the basic concepts of engineering chemistry. Students will be familiarized with basic concept of water, polymers, catalyst, electrochemistry, environmental chemistry, organic reaction mechanism etc.

## 2. Course Objectives:

The general objectives of the course are as follows:

- To acquaint the students with basic concepts of the Thermodynamics and electrochemistry.
- To enable the students to understand the basic idea of the co-ordination chemistry.
- To enable the students to understand the basic Knowledge of catalyst, characteristic of catalyst and application.
- To understand water and its qualities, estimation of hardness of water, softening of water etc.
- To be familiarize with Air Pollution, water Pollution, Soil pollution and their Pollutants, adverse effects pollution and possible control.
- To be introduced with stereochemistry, Geometrical isomerism, optical isomerism and terms used in the optical isomerism recemic mixture and resolutions,
- To get the concept of some organic reactions and their mechanism and also to get the idea about basic concept of polymers and polymerization.

## 3. Specific Objectives and Contents:

| Specific Objectives | Contents |
|---|---|
| Understanding the 1st and 2nd law of thermodynamics, free energy and spontaneity, Maxwell | **Unit I: Thermodynamics and Electrochemistry (10)hour**<br>First and 2nd law of thermodynamics. Definition of free energy and spontaneity - Maxwell relations - Gibbs- |

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| relations, Gibbs-Helmholtz equation- Van't Hoff equations.<br>To understand Electro chemical cells, Electrode Potential and standard electrode potential, Measurement of electrode potential, Nernst equation, E.M.F. and to understand the corrosion and its control | Helmholtz equation - Van't hoff equations.<br>Electro chemical cells, Electrode Potential and standard electrode potential, Measurement of electrode potential, Nernst equation, E.M.F. Of cell, Application of electrochemical and electrolytic cells, Electrochemical Series and its application.<br>Principles of chemical and electrochemical corrosion, Factor influencing corrosion, corrosion control. |
| | **Unit II: Coordination Complexes**<br>**7 (hour)** |
| To introduce about the co-ordination complexes, theories of co-ordination complexes and nomenclature, valence bond theory and its application in the formation of tetrahedral, square planar and octahedral complexes, limitation of valence bond theory, application of coordination complexes | Introduction, terms used in coordination complexes, Werner's theory of coordination complexes, Sidgwick's model and Sidgwick's effective atomic number rule, Nomenclature of coordination compounds (Neutral type, simple cation and complex anion and complex cations and simple anion type) valence bond theory of complexes, application of valence bond theory in the formation of tetrahedral complexes , square planar complexes and , octahedral complexes, limitation of valence bond theory, application of coordination complexes |
| | **Unit III: Catalyst:**<br>**4 (hour)** |
| • Describe the catalyst and catalytic poisoning, types of catalyst and application of | Introduction, action of catalyst (Catalytic promoters and catalytic poisoning), characteristic of catalyst, type of catalyst, theories of catalysis, application of catalysts. |
| | **Unit IV: Water**<br>**4( hour)** |
| • To understand water quality parameters, Definition and expression, Estimation of hardness (EDTA method), Alkalinity (Titrimetry), Water softening. | Water quality parameters, Definition and expression, Estimation of hardness (EDTA method), Alkalinity (Titrimetry), Water softening (zeolite) - Demineralisation (Ion- exchangers) Domestic water treatment. |
| • To understand the air pollution, water pollution, soil pollution and pollutants involving pollutants and possible control of pollution, ozone depletion. | **Unit V: Environmental Chemistry**<br>**6 (hour)**<br>Air Pollution, Air pollutant: $SO_2$, $NO_2$, $CO_2$ ,$O_3$ and hydrocarbons, effect of Air pollution on environment and possible control, green house effect, Ozone depletion and its photo chemistry, water Pollution, water Pollutants and their adverse effects and control, Soil pollution, soil Pollutants and their adverse effects and possible control |
| • To get knowledge about | |

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| Geometrical isomerism, optical isomerism, optical activity, recemic mixture and resolutions<br><br>• To get the concept of some organic reactions and their mechanism, substitution and elimination Reactions and their types.<br><br>• To familiar with addition, condensation and co-polymerization, preparation and application of polymers, thermoplastic and thermosetting plastics, sulphur based polymers. | **Unit VI: Stereochemistry**<br>**4 (hour)**<br>Introduction, Geometrical isomerism(Cis Trans Isomerism) Z and E concept of geometrical isomerism, optical isomerism , terms optical activity, Enantiomers, Diastereomers, meso structures, recemic mixture and resolutions<br><br>**Unit VII: Organic Reactions & mechanism**<br>**4 (hour)**<br>Substitution reaction, types of substitution reactions $SN^1$ , $SN^2$<br>elimination Reactions, types of Elimination reactions $E_1$ and $E_2$,<br>Factors governing $SN^1$, $SN^2$ , $E_1$ $E_2$ reaction mechanism<br><br>**Unit VIII: Polymers**<br>**6 (hour)**<br>Introduction, polymers and polymerization, Monomer - Functionality - Degree of polymerisation - Classification based on source and applications - Addition, Condensation and copolymerization. preparation and application of polyethene, polystyrene, PVC, teflon, nylon 6,6 Bakelite, epoxy resin, Thermoplastics and thermosetting plastics - sulphur based Polymers, |
| *Note: The figures in the parentheses indicate the approximate periods for the respective units.* | |

**References:**


1. Engineering Chemistry by Jaij and Jain
2. A text book of Engineering Chemistry by Shashi Chawala
3. A new concise Inorganic Chemistry by J.D. Lee
4. Principle of physical chemistry by Marron and Pruton
5. Essentials of Physical Chemistry by Bahl and Tuli
6. Selected topics in physical chemistry by moti kazi Sthapit
7. Balasubramanian M.R., Krishnamoorthy S. and Murugesan V., " Engineering Chemistry ",
8. Allied Publisher Limited., Chennai, 1993.
9. Kuriakose, J.C. and Rajaram J., " Chemistry in Engineering and Technology ", Vol. I and II,

Far Western University

**Faculty of Engineering**

Mahendranagar, Kanchanpur

**Course Title: Engineering Drawing I**
**Course No: AR 113**
**Nature of the Course: Theory +Practical**
**Level: B.E.**
**Degree: Bachelor's Degree in Civil Engineering**

**Credit: 2**
**Number of period per week: 3**
**Total hours: 45+15**
**Year: First, Semester: First**

**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 drawing, etc.

**2. Objectives:**

To develop the basic understanding and enhance the skills of engineering graphic technology to the students. Also 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 8(hrs)**<br>1.1 Equipment and Materials; Description of drawing instruments, auxiliary equipment and drawing materials<br>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)**<br>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 |

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| • Use of dimension technique and dimension conventions | **Unit III: Dimensioning 2(hrs)**<br>3.1 Fundamentals and techniques; size and location dimensioning, measurement units, SI conventions<br>3.2 General dimensioning practices, placement of dimensions; aligned and unidirectional |
| • Types of scale<br>• Application of scale and | **Unit IV: Engineering Scale: 2(Hrs)**<br>4.1 Use of scales, , reducing and enlarging drawings<br>4.2 Representative Factor,<br>4.3 Construction and Types of Scales, Plain Scales, Diagonal Scales, Vernier Scales, Comparative Scales<br>4.4 Scale of Chords |
| • Enhance skills and technique in 2D and 3D geometry<br>• Applications of conic sections, space curves, and other engineering curves<br>• Generate ideas about solids. | **Unit V Applied Geometry 8 (Hrs)**<br>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<br>5.2 Methods for drawing standard curves such as ellipses, parabolas, hyperbolas, involutes, spirals, cycloid, helices and cam or heart wheel.<br>5.3 Solid Geometrical Construction; Classification and pictorial representation of solid regular objects such as; Prisms: square, cubical, triangular and oblique<br>Cylinders: right and oblique Cones: right and oblique,<br>Pyramid : square, triangular, oblique, truncated, Doubly-Curved and Warped Surfaces: Sphere, torus, oblate ellipsoid, serpentine, paraboloid, hyperboloid |
| • Explain the history of Descriptive Geometry<br>• Understand the way of locating point, line, plane and solid in space<br>• Develop idea of solving geometry when given verbally.<br>• Calculate angle and length of lines and planes when they are in space | **Unit VI Basic Descriptive Geometry 4(Hrs.)**<br>6.1 Introduction: Application of descriptive geometry, principles to the solution of problems involving positioning of objects in three-dimensional space<br>6.2 The projection of points, lines, planes and solid in space<br>6.3 Projection of Solids Placed in different positions,<br>6.4 Parallel Lines<br>6.5 True Length of Lines; horizontal , inclined and oblique lines<br>6.6 Perpendicular Lines<br>6.7 Bearing of a Line<br>6.8 Point view or End View of a Line<br>6.9 Shortest Distance from a point to a Line<br>6.10 Principal Lines of a plane<br>6.11 Edge View of a plane<br>6.12 True shape of an Oblique plane<br>6.13 Intersection of a Line and a plane<br>6.14 Angle Between a Line and a plane<br>6.15 Angle Between Two Intersecting Lines<br>6.16 Angle Between Two Non- Intersecting (Skew) lines |

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| | 6.17 Angle between two planes<br>6.18 Shortest Distance Between Two Skew Lines |
| • Understand the classification projection<br>• Learn the symbol of projection<br>• Understand the process of changing 3D figure into 2D figure<br>• Learn the idea of hidden lines for unseen parts | **Unit VII Theory of Projection and Orthographic Projection 9(hrs)**<br>7.1 Common types of projections – Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection<br>7.2 System of orthographic projection First angle projection and Third angle projection<br>7.3 Principal Views; Methods for obtaining orthographic views Projection of lines, angles and plane surfaces; analysis in three views<br>7.4 Projection of curved lines and surfaces, object orientation and selection of views for best representation Full and hidden lines<br>7.5 Orthographic Drawings; making an orthographic drawing, visualizing objects from the given views 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<br>• Use of section lines<br>• Conventions for hidden lines, holes, ribs, spokes | **Unit VIII Sectional 3 (Hrs.)**<br>6.1 Full Section<br>6.2 Half Section<br>6.3 Broken Section<br>6.4 Revolved Section<br>6.5 Removed (Detail) Section<br>6.6 Phantom or Hidden Section<br>6.7 Auxiliary Sectional views<br>6.8 Specifying Cutting Planes for Section |
| • Develop the concept of development of outer surface of solids<br>• Develop an idea of penetration of solids into planes<br>• Understand the process of generation of curves on the surface of when different solids get | **Unit IX Developments, Intersections and Interpenetration 8(Hrs.)**<br>10.1 Developments of a right or oblique prism, cylinder, pyramid and cone<br>10.2 Development of a truncated pyramid and cone Triangulation method for approximately developed surfaces<br>10.3 Transition pieces for connecting different shapes Development of a sphere<br>10.4 Intersections & Interpretation<br>10.5 Lines of intersection of geometric surfaces<br>10.6 Piercing point of a line and a geometric solid<br>10.7 Intersection lines of two planes<br>10.8 Intersection of prisms and pyramids<br>10.9 Intersection of a cylinder and an oblique plane<br>10.10 Intersection of a sphere and an oblique plane |

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| intersected / penetrated | 10.11 Constructing a development using auxiliary views<br>10.12 Intersection of two cylinders<br>10.13 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:**


- Luzadder W.J. (1981). *Fundamentals of Engineering Drawing,* Prentice Hall.
- French T E., Vierck C.J. and Foster R.J (1981). *Engineering Drawing and Graphic Technology*, McGraw Hill.
- Bhatt N.D. (2011) *Engineering drawing*, Charotar Publishing House.

Far Western University

**Faculty of Engineering**

Mahendranagar, Kanchanpur

Course title: Engineering Mathematics I — Credit: 3
Course No: SH111 — Number of period per week: 3
Nature of Course: Theory — Total hours: 45
Year: First, Semester: First
Level: Bachelor of Engineering (Civil)

**Course description**: The course aims to acquaint the students with the basic concept of differentiation, integration and their applications as well as plane analytic geometry and vector calculus.

**Course Objectives**:

1. To enable the students, to understand the differential and integral calculus and its applications.
2. To acquaint the students with the basic concept of plane analytic geometry.
3. To know the brief idea of vector calculus.

1. **Limit, Continuity and Derivative** **17 hours**

1.1 Basic concept of Limit, continuity and derivative of functions with their properties
1.2 Higher order derivatives
1.3 Mean value theorems ( Rolle's theorem, Lagrange's mean value theorem and Cauchy's mean value theorem),Taylor's series and Maclurin's series.
1.4 Indeterminate forms together with L'Hospital rule
1.5 Asymptotes to Cartesian and polar curves
1.6 Pedal equations to Cartesian and polar curves
1.7 Curvature and radius of curvature
1.8 Partial derivative of function of two or three variables
1.9 Extreme of a function of two and three variables

**2. Integration and its Applications** **14 hours**

2.1 Review of basic integration theory
2.2 Definite integral as the limit of sum
2.3 Definite integral with its general properties
2.4 Improper Integrals
2.5 Reduction formula; Beta and Gamma functions
2.6 Determination of area, length, volume and surface area of solid of revolution
2.7 Double integral of Cartesian curves only

**3. Plane Analytic Geometry** **8 hours**

3.1 Transformation of coordinates: Translation and rotation
3.2 Conic section (Parabola, Ellipse and Hyperbola)
3.3 Introduction of central conics only

**4. Vector Calculus** **6 hours**

4.1 Review of vector and scalar quantity
4.2 Space coordinates (Cartesian, Cylindrical and spherical)
4.3 Product of two or more vectors
4.4 Reciprocal system of vectors and their properties
4.5 Vector equation of lines and planes

**Reference Books**

1. Thomas, Finney, Calculus and Analytical Geometry Addison-Wesley
2. Erwin Kreyszing, Advanced Engineering Mathematics, John Wiley and Sons Inc.
3. Chet Raj Bhatta and et.al. Essentials of Mathematics, Ayam Publications
4. S.P.Shrestha, H.D.Chaudhary,P.R.Pokharel,A Textbook of Engineering Mathematics,vol.I

Far Western University

**Faculty of Engineering**

Mahendranagar, Kanchanpur

Course Title: English for Communication
Course No. : SH 117
Nature of Course: Theory
Level: B.E. (Civil)
Degree: Bachelor's Degree in Civil Engineering

Year: I; Semester: II
Credit : 3
Total hours 45

## 1. Course Introduction

This is a compulsory English course for B.E. students irrespective of their major subjects. The course exposes the students to the basic communication skills that they require in their day-to-day academic settings at the undergraduate level. The course begins with the four basic skills of language i.e. listening, speaking, reading and writing integrated with the vocabulary and grammar associated with them. Additionally, there is a separate chapter that focuses on the acquisition of the academic vocabulary in use.

## 2. Course Objectives

General objectives of this course are to:

a) develop communicative competence in order to successfully participate in the academic discourse
b) make students critical readers
c) expose students to the varieties of reading texts from different disciplines
d) help students develop critical thinking skills
e) expose them to the wealth of academic vocabulary in context
f) help students develop strategies of communication in speaking and writing

## 3. Contents in Detail with Specific Objectives

| Specific Objectives | Contents in Detail |
|---|---|
| • Listen for main ideas and details<br>• Make inferences<br>• Listen for opinions | **Unit One: Listening**<br>1.1. Listening for gist – skimming<br>1.2. Listening for detail understanding |

| | |
|---|---|
| • Follow a summary<br>• Listen for specific information<br>• Understand figurative expressions to interpret speaker's intention<br>• Listen for signposts to understand the structure of the text<br>• Listening for rhetorical questions to understand the structure of a lecture | 1.3. Making inferences and forming opinions from listening<br>1.4. Summarizing what was listened<br>1.5. Listening for comprehension<br>1.6. Comprehending figurative expressions and rhetorical expressions in speech |
| • Participate in a conversation<br>• Make notes to prepare for a presentation or group discussion<br>• Take turns to make conversation go smoothly<br>• Give advice, ask for clarification, express reasons, ask for reasons, ask questions<br>• Lead discussions in groups<br>• Prepare dialogues with a partner for various conversation | **Unit Two. Speaking**<br>2.1. Engaging in conversation<br>2.1. Presentation skills<br>2.3. Turn taking<br>2.4. Language functions in the academic settings<br>2.5. Dialogues and group discussion<br>2.6. Leading group discussion |
| • Use graphic organizers to understand texts<br>• Read and find the central idea of the text<br>• Comprehend different types of texts<br>• Locate specific information in the texts<br>• Identify source of information | **Unit Three. Reading**<br>3.1. Using graphic organizers to understand texts<br>3.2.Reading for central theme<br>3.3. Comprehending different text types<br>3.4. Locating specific information in texts<br>3.5. Identifying source of information |
| • Analyze and develop paragraphs of different genres<br>• Plan for writing<br>• Revise, edit and rewrite<br>• Write summaries<br>• Write personal response to the texts<br>• Write different letters<br>• Write different types of essays | **Unit Four. Writing**<br>4.1. Analyzing and writing paragraphs<br>4.2. Process writing<br>4.3. Summary writing<br>4.4. Letter writing<br>4.5. Responding to the texts in writing<br>4.6. Essay writing |
| • Use the academic vocabulary in professional communication.<br>• Select and use academic vocabulary in writing assignments<br>• Recall and use appropriate vocabulary in a range of academic discourse<br>• Apply appropriate strategies to enrich their academic vocabulary. | **Unit Five. Vocabulary**<br>5.1. Academic vocabulary<br>5.2. Word combinations<br>5.3. Vocabulary at the academic institutions<br>5.4. Vocabulary of academic conversation<br>5.5. Reading and vocabulary<br>5.6. Writing and vocabulary |
| • Explain ideas and reflect on them<br>• Connect ideas across texts or readings<br>• Relate personal experience to the topic<br>• Blend information from various texts<br>• Evaluate experiences and events | **Unit Six. Critical Thinking**<br>6.1. Comparing and contrasting information<br>6.2. Connecting ideas across texts or reading<br>6.3. Writing with personal reflections and experience<br>6.4. Synthesizing information from various sources<br>6.5. Evaluating ideas |

## 7. References


1. Daise, D., Norloff, C. and Carne, P. (2011) ). *Q: Skills for Success (Reading and Writing) – 4.* New York. Oxford University Press. (Unit I, II and VI)
2. Freire, R. and Jones, T. (2011). *Q: Skills for Success (Listening and Speaking) – 4.* New York. Oxford University Press. (Unit III, IV and VI).
3. McCarthy, M. and O'Dell, F. (2008). *Academic Vocabulary in Use.* New Delhi. Cambridge University Press. (Unit V).


Far Western University

**Faculty of Engineering**

Mahendranagar, Kanchanpur

**Course Title: Physics (**Electricity and Magnetism) **Credit:** 3
**Course No: SH 115** **Number of period per week:** 3
**Nature of the Course:** Theory **Total hours:** 45
**Year:** First, **Semester:** First **Level:** B.E. (Civil)
**Degree: Bachelor's Degree in Civil Engineering**

**Course Introduction**

The course intends to enable the students to be acquainted with the basic concepts and principles of electricity and magnetism. Students will be familiarized with the fundamentals of electrostatics, magnetostatics, electric and magnetic fields in matter, electromagnetic induction, Maxwell's equations, electromagnetic waves, etc.

**Objectives**

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

- to acquire sufficient basic knowledge in electricity and magnetism.
- to apply this knowledge base for studying major courses.
- to introduce the concepts and methods of electricity and magnetism needed for application in various areas.

**Unit I: Elementary Vector Analysis (6 hrs)**

Gradient of a scalar, Divergence and curl of a vector, Product rules, Second derivatives, Integral Calculus, Gauss's, Stoke's and Green's theorems

**Unit II: Electrostatics (7 hrs)**

The electric field, Coulomb's law, Divergence and curl of electrostatic fields, Electric flux, Gauss's law and it's applications, Electric potential, Equipotential surface, Poisson's equation

and Laplace's equation, Potential and field due to an electric dipole, Potential due to an infinitely long charged wire, Potential and field due to an uniformly charged disc, Electrostatic boundary conditions, Method of images

**Unit III: Electric Fields in Matter (6 hrs)**

Dielectrics, Induced dipoles, Polar and non-polar molecules, Dielectric polarization, Electric field due to a polarized dielectric (three electric vectors), Gauss's law in the presence of dielectrics, Energy stored in an electric field in the presence of dielectric, Boundary conditions on field vectors

**Unit IV: Magneto statics (6 hrs)**

The Lorentz force law, Magnetic field and the magnetic flux, The Biot-Savart law and its applications, Divergence and curl of B, Ampere's law and its applications, Magnetic vector potentials, Magnetic dipole, Magneto static boundary conditions

**Unit V: Magnetic Fields in Matter (4 hrs)**

Diamagnets, paramagnets and ferromagnets, Torques and forces in magnetic dipoles, Magnetization, Magnetic susceptibility and permeability, Ferromagnetism, Hysteresis

**Unit VI: Electromagnetic Induction (4 hrs)**

Faraday's law, Self and mutual induction, Self inductance of a solenoid, Toroid and two long parallel wires, Energy in magnetic fields, Transformer

**Unit VII: Maxwell's Equations (6 hrs)**

Maxwell's equations, The displacement current, Magnetic charge, Maxwell's equations in matter, Boundary conditions, The continuity equation, Poynting's theorem

**Unit VIII: Electromagnetic Waves (6 hrs)**

The wave equation, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal and oblique incidence

**Prescribed Text:**

*Introduction to Electrodynamics*, D. J. Griffith, Prentice Hall, 3rd Edition, 1999

**References:**

- *Foundations of Electromagnetic Theory*, J. R. Ritz, F. J. Milford and R. W. Christy, Narosa Publishing House, 1998
- *Physics: Part II*, R. Resnick and D. Halliday, Wiley Eastern Limited, 1985
- *Classical Electromagnetism*, J. Franklin, Pearson Education, 2005


**Far Western University**
**Bachelor of Engineering (Civil)**
**Course of Study 2070**

**Course Title: Physics Practical** **Year: I, Semester: I**
**Nature of the Course: Practical** **Credit: 1**

**Objectives:**

By the end of the course the student should be able to:

- Measure correctly the basic physical quantities
- Determine errors in measurements
- Analyze raw data and make valid conclusions
- Validate corresponding theoretical component
- Develop proper laboratory skills
- Design basic physics experiments
- Interpret experimental results and draw logical conclusions
- Relate theoretical concepts to practical skills

**List of Experiments:**

1. From given set of data, calculate the standard deviation, standard error and probable error.
2. By using method of least square, draw the best straight line through a set of given data points and find the error in slope.
3. Determine the moment of inertia of a flywheel.
4. Determine the value of acceleration due to gravity by using a Bar Pendulum
5. Determine the Young's modulus of given material by bending beam method.
6. Calibration of CRO for the measurement of voltage and frequency
7. Draw I-V characteristics of Ohmic and non Ohmic resisters and find voltage current relation.
8. Study the temperature dependence of resistance of given semiconductor
9. Determine the moment of inertia of a fly wheel.
10. Determine the impedance of a given LCR circuit.
11. Study the characteristic of simple and zener diode
12. Construct and study the working of NOT-AND-OR, NAND and NOR gates.
13. Construct and study the working of OR, NAN and NOR gates.

**References:**


1. *B.Sc. Practical Physics*: C. L. Arora, S. Chand and Company Ltd
2. *Practical Physics:* G. L. Squires, Cambridge University Press
3. *Practical Physics:* P. K. Shukla and A. Srivastava, New Age International (P) Ltd