APPLIED MECHANICS

CE 156

Lecture : 3 **Year : I**
Tutorial : 2 **Part : II**
Practical : 0

Course Objectives:
This course helps to analyze the effect of various types of Forces on the particle and rigid body at rest. It also provides concept and knowledge of Engineering Application and helps to understand Structural Engineering in later courses by using basics of Mechanics in their branch of engineering.

1 Basic Concept of Mechanics and Static Equilibrium (6 hours)

1.1 Definitions, Type and Scope of Mechanics
1.2 Fundamental Concepts and Principles of Engineering Mechanics
1.3 Concept of Particle, Rigid and Deformed Bodies
1.4 Physical Meaning of Equilibrium and its Essence in Structural Application
1.5 Equation of Equilibrium in 2D and 3D Analysis of Particle and Rigid Body
1.6 Concept of Free Body Diagram with Examples

2 Forces Acting on Particle and Rigid Body (10 hours)

2.1 Different Types of Forces: Internal/External Force, Adhesive/ Cohesive Force, Point/ Line/ Surface Force and Contact/ Body Force
2.2 Resolution and Composition of Forces
2.3 Principle of Transmissibility and Equivalent Forces
2.4 Varignon's Theorem and it's Application
2.5 Moments of a Force About a Point and About an Axis
2.6 Definition, Types and Characteristics of Couple
2.7 Resolution of a Force into a Force and a Couple

3 Friction (5 hours)

3.1 Definition, Types and Uses of Friction, Laws of Friction, Static and Dynamic Coefficient of Friction, Angle of Friction
3.2 Sliding and Overturning Condition of a Body
3.3 Practical Examples of Dry Friction (Ladder and Wedge Friction)

4 Analysis of Simple Beams and Frames (12 hours)

4.1 Introduction to Structures
4.2 Various Types of Load on the Structure
4.3 Various Types of Supports; Reactions and Degree of Freedom
4.4 Internal and External Forces in the Structure
4.5 Relationship Between Load, Shear Force and Bending Moment
4.6 Statically and Geometrically Stable/ Unstable Beams and Frames
4.7 Statically Determinate and Indeterminate Beams and Frames, Degree of Static Indeterminacy
4.8 Axial Force, Shear Force and Bending Moment Diagrams for Determinate Beams and Frames

5 Analysis of Plane Trusses (6 hours)

5.1 Definition of Truss, Assumption of Ideal Truss, Types and Uses of Truss in Engineering
5.2 Statically and Geometrically Stable and Unstable Truss
5.3 Statically Determinate and Indeterminate Truss, Degree of Static Indeterminacy
5.4 Analysis of Truss by the Method of Joint and Section/ Moment

6 Centre of Gravity, Centroid, Moment of Inertia, and Mass Moment of Inertia (6 hours)

6.1 Concepts of Centre of Gravity and Centroid of Line, Area and Volume
6.2 Second Moment of Area/Moment of Inertia and Radius of Gyration
6.3 Perpendicular and Parallel Axis Theorem for Moment of Inertia

Tutorials
There shall be related tutorials exercised in class and given as regular homework exercise. Tutorial can be as following for each specified chapters

1. Basic Concept of Mechanics and Static Equilibrium (2 hours)
2. Forces Acting on Particle and Rigid Body (6 hours)
3. Friction (3 hours)
4. Analysis of Simple Beams and Frames (8 hours)
5. Analysis of Plane Trusses (5 hours)

6. Centre of Gravity, Centroid, Moment of Inertia and Mass Moment of Inertia (6 hours)

Final Exam

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

Chapters	Hours	Mark distribution*
1	6	6
2	10	12
3	5	6
4	12	16
5	6	10
6	6	10

Reference

1. Beer F.P. and E.R. Johntson “Vector Mechanics for Engineers”, Tata McGraw Hill Publishing Co.Ltd.
2. R.C. Hibbler, Ashok Gupta, “Engineering Mechanics –Statics and Dynamics”, New Delhi, Pearson,
3. I.C. Jong and B.G. Rogers, “Engineering Mechanics- Statics and Dynamics”,
4. R. Suwal, “A Text Book of Applied Mechanics” Second Edition, Mark Line Publication
5. H.R. Parajuli and S. Neupane “Applied Mechanics for Engineers” M.K. Publishers and Distributors
6. M.R. Dhital, “A Course Manual on Applied Mechanics I (Statics)”, TU, IOE, CIMDU,
7. Shame, I.H., “Engineering Mechanics- Statics and Dynamics”, Prentice Hall of India, New Delhi,
8. R.S. Khurmi, “A Text Book of Engineering Mechanics”

ARCHITECTURAL GRAPHICS II
AR 151

Lecture : 2 **Year : I**
Tutorial : 0 **Part : II**
Practical : 3

Course Objectives:
This course introduce two and three dimensional compositions, color application and presentational techniques in architectural drawing and understanding architectural graphics as a means of visual communication. This course provide students with basic knowledge of graphical and presentational techniques through various exercises

1 Sciography (10 hours)

1.1 Introduction - terms of sciography
1.2 Types of source of light: Natural and Artificial
1.3 Principles of sciography
1.4 Its importance, use and application
1.5 Types of Sciography - Orthographic Sciography, Parallel projection Sciography and Perspective projection Sciography
1.6 Various exercises in Sciography from design element to architectural drawings
1.7 Application of Sciography in geometrical and architectural drawings

2 Color theory & its applications (6 hours)

2.1 Color
  2.1.1 Color wheel
  2.1.2 Color scheme
  2.1.3 Properties of Color
  2.1.4 Effects of Color - Physical, Psychological and Emotional
2.2 Application of colors in architectural buildings (Exterior and Interior)
2.3 Composition of Collage/ Magazine cover

3 Appropriate rendering techniques in Buildings (6 hours)

3.1 Floor Plans including furniture layout
3.2 Elevations
3.3 Sections
3.4 Site Plan and Master Plan
3.5 Landscape
3.6 Shadow construction in plans and elevations
3.7 Perspective drawing (Exterior & Interior)

4 Architectural rendering development skill in different mediums (8 hours)

4.1 Rendering in architectural building (Exterior/Interior)
- 4.1.1 Pencil rendering
- 4.1.2 Pen and Ink rendering
- 4.1.3 Pencil color/Water color rendering

Practical (45 hours)

1. Exercise on Sciography projection of different solid figures
2. Exercise on Sciography projection of different solid figures
3. Exercise on Sciography projection into wall and ground plane.(Solid objects)
4. Exercise on Sciography projection of roof overhang into wall plane
5. Exercise on Sciography projection of walls and roof overhang into ground plane
6. Exercise on Sciography projection of colonnades and arches into wall and ground planes
7. Exercise on Sciography projection of different steps
8. Exercise on Sciography projection of chimney stacks and dormer window in pitched roof (two way slope roof)
9. Exercise on Sciography projection of a set of a residential building (Elevations, site plan with landscape elements.)
10. Exercise on color wheel
11. Color Scheme
12. Tint and Tone
13. Application of color in Magazine Cover/ Collage
14. Rendering techniques on Floor Plans including furniture layout (Pencil medium)
15. Rendering techniques on Site plan/Master plan (Pencil medium)
16. Exercises on rendering techniques in different mediums (Pencil colors, pen and ink and water color)
17. Delineate a set of simple residence with shadow construction (sciography) in any medium
18. Delineate a perspective view (angular exterior view) of a set of simple residence in any medium
19. Delineate an interior perspective view (parallel perspective) of living space of a simple building in any medium including flooring, furnishing and fixtures

Final Exam

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

Chapter	Hours	Mark distribution*
1	10	20
2	6	10
3	6	15
4	**8**	**35**
Internal Assessment (10%)		**10(Internal Assessment)**
Attendance	**70%**	**10**
		100

* There may be minor deviation in marks distribution.

References

1. D.K.Ching, “Architectural Graphics”
2. K. Venugopal “Engineering Drawing & Graphics”
3. N.D. Bhatt & V.M. Panchal, “Engineering Drawing (Plane & Solid Geometry)”
4. T.E. French, C.J. Vierck and R.J. Foster, “Engineering Drawing Graphic Technology”
5. Michael E. Doyle, “Colour Drawing”
6. Robert W. Gill, “Rendering with Pen & Ink”
7. Robert W. Gill, “Basic Rendering”
8. Paul Laseau, Graphic Thinking for Architects and Designers.
9. Halse, “Rendering Techniques”
10. Mike W. Lin, Design and Drawings with Confidence
11. William P. Spence, “Architecture Drawing".

BUILDING CONSTRUCTION I

AR153

Lecture : 2 **Year : I**
Tutorial : 0 **Part : II**
Practical : 3

Course Objectives:
The main objective is to introduce the students to the basic process and techniques of building construction. The specific objectives use to gain Knowledge about major building components in the substructure and superstructure, To gain knowledge of building construction materials and observe the practical implementations field visits, focused on traditional Nepalease architecture.

1 Introduction (1 hour)

1.1 Construction techniques as per building design and working drawing
1.2 Importance of proper construction work for design output
1.3 Importance of national guidelines in building construction- Nepal Building Code (NBC) and Mandatory Rules of Thumb (MRT)

2 Site works and Setting Out (2 hours)

2.1 Commencement, preconstruction of work vis possession of site
2.2 Prepartion of site (potential identification and clearing) and building layout

3 Soil Investigation (4 hours)

3.1 Soil types and their characteristics
3.2 Foundations in weak soil with reference to black cotton soil
3.3 Method of improvement of soil bearing capacities

4 Excavation (1 hour)

4.1 Requirement of excavation
4.2 Process of excavation
4.3 Challenges of excavation (hazards and safety)

5 Timbering in Trenches (2 hours)

5.1 Timbering in shallow foundations in hard soil to loose soil
5.2 Timbering in shallow foundations in water logged soil

6 Foundation and their types (6 hours)

6.1 Intoduction to foundation
6.2 Functions and Characteristics of foundation
6.3 Types of shallow Foundation – Spread, Strap, Combined and Raft Foundation
6.4 Types of Deep foundation – Pile, Well and Peer Foundation
6.5 Foundation design in Traditional Nepalese Architecture

7 Damp Protection (4 hours)

7.1 Moisture movement in building
7.2 Sources, causes and defects of dampness
7.3 Methods of damp proofing, damp proof course, materials used for damp protection
7.4 Selection of appropriate DPC materials for different parts of building

8 Floor Structure (4 hours)

8.1 Introductions to floors, Classification and materials of construction
8.2 Ground floor – Solid Ground Floor and Suspended Timber Floor
8.3 Upper Timber Floor

9 Masonry wall (4 hours)

9.1 Introduction to wall types, materials and mortars used
9.2 Stone Masonry
9.3 Brick Masonry
9.4 Concrete block masonry
9.5 Trends in Masonry Wall
Hollow Block Masonry – Concrete and Brick
AAC Block
Others

10 Openings in wall (2 hours)

10.1 Lintels, Arches and their types
10.2 Materials of construction

Theory Assignments

1. Field Visits and reports
2. Assessments with MCQ

Practical **(45 Hours)**

Drawing sheets

Evaluation of Practical Assignment

S.No	Units	Hours
1	2	3
2	3	3
3	4	6
4	5	9
5	7	6
6	8	6
7	9	6
8	10	6
Total		**45 Hours**

Final Exam

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

Chapter	Hours	Mark distribution*
1,2,3,4,10	10	6
5	2	6
6,7	10	6
8	4	6
9	4	6
Total	30	30

* There may be minor deviation in marks distribution.

References

1. R. Barry, "The Construction of Buildings: Volume 1-5"
2. R. Chudley, "Construction Technology: Volume 1-4"
3. Chung, " Building Construction Illustrated"
4. Hans Banz, "Building Construction Details (Practical Drawings)"
5. Sushil Kumar, "Building Construction"
6. Gurucharan Singh, "Building Construction and Materials"
7. Rangawala, "Building Construction"
8. P.C. Varghese, "Building Construction"
9. WB Mackay, "Building Construction"
10. Mitchell, "Building Construction"

DESIGN STUDIO II*

AR152

Lecture : 2 **Year : I**
Tutorial : 0 **Part : II**
Practical : 8

Course Objectives:

This course objective is to analyze anthropometric data and spatial configurations, for exploring human dimensions and ergonomic (Design efficiency and comfort) considerations. This course deals with spatial configurations effectively, integrating anthropometric data and consider environmental factors like natural light and ventilation this course introduce anthropometrics and design concepts, to study existing building and extract insights for personal space design, learned design principles to their designs.

1 Introduction to Design standards (6 hours)

1.1 Understand and investigate the measurement of human figures and their movements in spaces
1.2 Anthropometric data collection methods
1.3 Application of anthropometric data with function and space in design
1.4 Case studies and real-world examples

2 Visual perception and form transformations (10 hours)

2.1 To analyze the key characteristics of natural objects and understand visual perception (form, color, background and so on)
2.2 Transformation of original forms into abstract/ architectural elements through dimensional alterations, addition, subtraction, and interplay between mass and void
2.3 To develop architectural forms and compositions maintaining the integrity of the original characteristics
2.4 To analysis on human scale; proportion with architectural elements and also in relation with culture and social aspects
2.5 To create 3D models based on transformed forms, exploring various configurations and spatial arrangements

3 Research and Design building programs, architectural spaces and compositions (14 hours)

3.1 To research on site, building programs and design principles of Architect. (Literature and interview base studies)
3.2 To analyze existing architectural spaces and compositions. (Case Study)
3.3 To experiment with different design concepts and spatial arrangements

Practical (120 hours)

1. Study of a project from Site, Building, Architects and client perspective. Make a report and poster of the same. (Group Work)

2. Continue of same project understating aspect of site by making model of the Project. (Group Work)

3. Project design on the basis of all above study and design process like bubble diagram, schematic layout, zoning, concept all as following design process with case study examples of projects: residences, restaurants, workshops, filling station, show room, city service centers, book shops and so on

4. Individual studies on anthropometric data for human proportion as well human in relation to position and functional aspects of human activity. Both international standard and Nepali standard should be studied and presentation by drawings

5. Standard space referencing international and national design standards. Examine and make case study of different element like furniture, fixture vehicle etc. with its use and required space for those element

6. Individual studies on anthropometric data for humans and its relation with surrounding, spaces referencing international and national design standards. To create space standard as module. Example like standard toilets, kitchen. Class room, office, Parking, ramp etc. (data base design of anthropometric data)

7. Apply knowledge from group case study on anthropometric data with space and elements and create own design of similar functions. For example design of café if they make a study of restaurant or book store if they make a case study of library. etc. interior base project focus on data base

8. Exercise on a natural object and identify its distinctive characteristics in terms of form, pattern, and shape. To abstract these features through dimensional transformations, additions, and subtractions, exploring foreground-background interplay and mass-void relationships. Final output

in architectural forms while maintaining identity, employing ordering principles like axis, symmetry, and hierarchy

9. Exercise with case study on an architecture element to study human proportion and scale with Nepalese traditional Building as well international architecture to know the change in standard of scale to define volume and value of space

10. To develop a program for a designer project (vehicle service center, bus park, public toilet, studio etc.). Collection of anthropometric data, site visit (case study) for insights, and prepare bubble diagrams based on user analysis. Finally, formulate a program specifying target users, space requirements

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below final exam will by taken by the departmental jury.
(Group Work)

Chapters	Hours	Mark distribution*
1-3	4-6 hours	100*

* There may be minor deviation in marks distribution.

Note:
Internal:50 marks
External:50 marks

References

1. Gill, R. W. (2011). Rendering with pen and ink. London: Thames and Hudson.
2. Neufert, P.,(2000) “Architects’ Data”, 3rd Ed., Blackwell Science.
3. Ching, K. D. (2022). Architecture Graphics. John Wiley & Sons.7th Edition
4. Watson, D. (Editor), (2005) “Time-saver Standards for Architectural Design: Technical Data for Professional Practice”, 8th 2005 Ed.
5. Doorley, Scott, Witthoft, Scott(2012), “Make Space – How to set the stage for creative collaboration”, John Wiley & Sons.
6. Ching, F.D.K.,(1998) “Design Drawing”, Van Nostrand Reinhold.

FREE HAND SKETCHING II

AR 155

Lecture : 2 **Year : I**
Tutorial : 0 **Part : II**
Practical : 3

Course Objectives:

This course is designed to provide the students with knowledge and basic skills of free hand sketching. In this course, students will be able to learn the basics of sketching, shading, texture, perspective and composition in different techniques like pencil, ink pen, water colour, etc. This course develops the concept of free hand sketching graphically to express 3-D objects and views of building and surroundings for effective visual thinking of architecture students.

1 Introduction (4 hours)

1.1 Importance of free hand sketching in architecture
1.2 Introduction of advance free hand sketching skill – interior, exterior, landscaping and city scaping
1.3 Warm up exercises of light, shade and shadow by using of pencil, ink and colour in different objects
1.4 knowledge of architectural rendering

2 Free Hand practice of Landscaping (4 hours)

2.1 Free Hand exercise of landscaping by colour techniques
2.2 Free Hand exercise of landscaping by ink techniques

3 Fast sketching (4 hours)

3.1 Fast sketching of different 3D forms, trees, vehicles, furniture, human figures in colour and ink techniques
3.2 Free Hand sketching of self-portrait by using Pencil and colour techniques

4 Free Hand Sketching of Interior spaces (6 hours)

4.1 Free Hand exercise of interior of historical spaces with rendering in pencil, ink and colour techniques
4.2 Free Hand exercise of interior of modern spaces with rendering in pencil, ink and colour techniques

5 Free Hand Sketching of Exterior spaces (6 hours)

5.1 Free Hand exercise of exterior of historical spaces with rendering in pencil, ink and colour techniques

5.2 Free Hand exercise of exterior of modern spaces with rendering in pencil, ink and colour techniques

5.3 Free Hand exercise of city scaping in mixed medium (pencil, ink and colour techniques)

6 Sketching by memory and rendering in building and surroundings (6 hours)

6.1 Sketching of building and environment by memory in pencil

6.2 Rendering on façade and 3D views of building and surroundings in colour and ink medium

Practical (45 hours)

1. Basic exercise of line and tones in water colour and ink pen
2. Free Hand exercise of landscaping by colour techniques
3. Fast sketching of different 3D forms, trees, vehicles, furniture, human figures etc in colour and ink techniques
4. Free Hand sketching of self-portrait by using Pencil and colour techniques
5. Free Hand exercise of interior of modern spaces with rendering in pencil, ink and colour techniques
6. Free Hand exercise of interior of historical spaces with rendering in pencil, ink and colour techniques
7. Free Hand exercise of exterior of modern spaces with rendering in pencil, ink and colour techniques
8. Free Hand exercise of exterior of historical spaces with rendering in pencil, ink and colour techniques
9. Sketching of building and environment by memory in pencil
10. Rendering on facade and 3D views of building and surroundings in colour medium
11. Free Hand exercise of city scaping in mixed medium (pencil, ink and colour techniques)
12. Test on rendering of facade and 3D views of building and surroundings in ink and colour medium

Evaluation Scheme

Activities	Marks	Remarks
Studio Participation	6	
Assignment Sheets	45	
Test	**9**	
Total	**60**	

Final Exam

The questions will be covered all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below. The final practical exam will be taken by the department:

Chapters	Hours	Mark distribution*
1,2,3	0.5	10
4,5	2	25
6	0.5	5
Total	**3**	**40**

* There may be minor deviation in marks distribution.

References

1. Keshaw Kumar, (2011). Easy to Draw – Still life, Adarsh Enterprises, New Delhi, India
2. Keshaw Kumar, (2000). Easy to Draw – Landscapes, Adarsh Enterprises, New Delhi, India
3. Peter Gray, (2006). The essentials of Drawing – Arcturus Publishing, London, UK
4. Ching, Francis: Architecture: Form, Space and order
5. Deasy, C.M : Designing places for people.
6. Quick and clever Drawing – Michael Sanders, David & Charles, UK
7. Country Landscapes, Terry Harrison, Search Press, Kent, UK
8. Perspective, Milind Mulick, Jyotsna Prakashan, Pune, India

HISTORY OF NEPALESE ARCHITECTURE

AR154

Lecture : 3 **Year : I**
Tutorial : 0 **Part : II**
Practical : 1

Course Objectives:

The main objective is to develop a comprehensive understanding of the historical development of Nepalese architecture, spanning from the ancient to the Rana sub-periods and investigate the impact of cultural and contextual factors, including politics, religion, society, climate, and geography, on Nepalese architectural vocabulary. This course emphasis the significance of preserving Nepal's architectural heritage and understanding its relevance in the broader context of global architectural history

1 Pre-historic period (3 hours)

1.1 Study of the Gopal and Mahishpal periods with reference to Purans and Vamshsvali

1.2 Architecture development in the Kirat period: studying sites, palaces, deochhen, etc.

2 Lichchhavi period (6 hours)

2.1 Architectural development in the Lichchhavi period studied sites, palaces, temples, chaityas, water spouts, etc.

2.2 Emphasise the study of planning and design concepts, form development, symbolism, ecological aspects, materials, and know-how technologies.

3 Malla period (28 hours)

3.1 Malla architectural development focused on palaces, temples, house forms, streetscapes, stupas/chaityas, bahal/bahil, pati/sattal, and other structures

3.2 The study should focus on planning, design, form, function, symbolism, and so on

3.3 The study also highlights how climate, geography, technology, and other factors shaped Malla era architecture

4 Shah period /Rana sub-period (4 hours)

4.1 Palaces, temples, dharahara, and other structures were the focus of Shah architectural development.

4.2 Rana architecture focuses mostly on palaces, gardens, clock towers, and riverside development.

4.3 The study also discusses the planning, design idea, materials, and building techniques used throughout that time period.

5 Development outside the valley (4 hours)

5.1 A brief architectural introduction to historical locations including Lumbini, Tilaurakot, and Ramgram, among others.

5.2 A quick architectural overview of Jhong Cave in Chhoser, Lomanthang, Marpha, and other locations

Practical (15 hours)

1. As part of their coursework, students are required to visit a historical site and compile inventory documents detailing the architectural features of traditional buildings.
2. To ensure that students do their allocated work, the campus or college will manage their field visit.

Final Exam

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

Chapter	Hours	Marks
1	3	12
2	6	12
3	28	12
4	4	12
5	4	12
Total	45	60

* There may be minor deviation in marks distribution.

References

1. Sudarshan Raj Tiwari. The ancient settlements of the Kathmandu Valley. Centre for Nepal and Asian Studies, Tribhuvan University.
2. Sudarshan Raj Tiwari. The Brick and the Bull. Himal Association, Patan.
3. Sudarshan Raj Tiwari. The Temples of the Nepal Valley. Himal Association, Patan.
4. Niels Gutschow. Architecture of the Newars: A History of Building Typologies and Details in Nepal (Three vols.). Chicago: Serindia Publications.

5. Mary Shepherd Slusser. Nepal Mandala: A Cultural Study of the Kathmandu Valley (2 Vols.) 1st Edition.
6. Wolfgang Korn. Traditional Architecture of the Kathmandu Valley: Bibliotheca Himalayaica. 2016.
7. Gerald Toffin. Man and his House in the Himalayas.
8. Niels Gutschow. The Nepalese Caitya: 1500 Years of Buddhist Votive Architecture in the Kathmandu Valley
9. Wolfgang Korn. The Sikharas: The Traditional Newar Architecture of the Kathmandu Valley
10. Wolfgang Korn. The Stupas and the Chaityas: The Traditional Newar Architecture of the Kathmandu Valley
11. John K. Locke. Buddhist Monasteries of Nepal: Survey of Bahas and Bahis of Kathmandu Valley
12. Sudarshan Raj Tiwari. Essays on culture and history of Bhaktapur: the capital of the Malla Nepal Mandala
13. Padmasundar Joshi. Hiti Pranali
14. Sukrasagar Shrestha. Jahruhiti
15. Niels Gutschow. Chorten in Nepal: Architecture and Buddhist Votive Practice in the Himalaya
16. John Harrison. Mustang Building: Tibetan Temples and Vernacular Architecture
17. Peter Herrle & Anna Wozniak. Tibetan Houses
18. Axel Michaels. Pasupatiksetra: A historical Inventory
19. Harald O. Skar. Nepal: Tharu and Tarai Neighbours
20. Ramesh Dhungel. The kingdom of Lo (Mustang) : a historical study
21. Mohan Pant. Thimi: Community and structure of a town Kathmandu Valley
22. Mohan Pant & Shuji Funo. Stupa and Swastika: Historical Urban Planning Principles in Nepal's Kathmandu Valley. Kyoto University Press

MATHEMATICS FOR ARCHITECTURE II
SH155

Lecture : 3 **Year : I**
Tutorial : 1 **Part : II**
Practical : 0

Course Objectives:
To equip students with a sound understanding of vector, matrices, probability and statistics enabling them to effectively apply these principles in their respective fields.

1 Vector Algebra and Calculus (10 hours)

1.1 Two and three dimensional vectors
1.2 Scalar products and vectors products of three and four vectors
1.3 Reciprocal system of vectors
1.4 Vector differentiation and integration: velocity and acceleration
1.5 Directional derivative and gradient
1.6 Divergence and curl

2 Matrices and Their Applications (10 hours)

2.1 Algebra of matrices
2.2 Rank of matrices and its application in system of linear equations
2.3 Vector space, linear dependence and independence
2.4 Linear Transfomations
2.5 Eigen value, Eigen vectors and Cayley-Hamilton theorem with applications

3 Statistics (10 hours)

3.1 Measure of Central tendency: mean, median and mode
3.2 Measure of partition : range, inter quartile range, quartiles, deciles and percentiles
3.3 Measures of dispersion : mean deviation, standard deviation
3.4 Correlation and regression
3.5 Measures of skewness and curtosis

4 Probability (10 hours)

4.1 Review of basic probability
4.2 Conditional probability, Bayes' theorem
4.3 Random variable and probability distribution
4.4 Binomial and Poisson's distribution

5 Mensuration (5 hours)

5.1 Area of regular polygon, area of irregular rectilinear figures, field book

5.2 Estimation of area using Trapezoidal Rule and Simpson's Rule

Tutorials

1. Vector Algebra and Calculus
2. Matrices and Their Applications
3. Statistics
4. Probability
5. Mensuration

Final Exam

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

Chapters	Hours	Mark distribution*
1.	10	14
2.	10	14
3.	10	14
4	**10**	**14**
5	**5**	**4**
Total	**45**	**60**

* There may be minor deviation in marks distribution.

References

1. Erwin Kreyszig, Advance Engineering Mathematics, John Willey and Sons Inc.
2. James Stewart, Calculus: Early Transcendental, Cengage Learning
3. Richard A. Johnson, Probability and Statistics for Engineers 7th edition, Miller and Freund's publication
4. Solid Mensuration with Proofs: Willis F. Kern and James R. Bland, Second Edition, John Wiley and sons.
5. Mensuration for indian schools and colleges Part 1: Orient Longman;1993