

Course Title: **Mathematics II (3 Cr.)**

Course Code: **CACS154**

Year/Semester: **I/II**

Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 1 Hrs)**

### Course Description

This course includes the topics from calculus and computational methods such as limits and continuity, differentiation & its applications, integration and its applications, differential equation and different computational techniques which are essential as mathematical foundation for computing.

### Course Objectives

This course makes students able to cognize the concept Calculus, Computational methods and their applications in the area of Social Science and Computer Application.

### Course Contents

#### Unit 1 Limits and Continuity

**6 Hrs.**

Limit of a function, Indeterminate forms, Algebraic properties of limit (without proof), Theorems on Limits of Algebraic and Transcendental Function. Continuity of a function, types of discontinuity. Exercises on evaluation of limits and test of continuity. (Mathematica)

#### Unit 2 Differentiation

**6 Hrs.**

Ordered Pairs, Cartesian Product, Relation, Domain and Range of a Relation, Inverse of a Relation; Types of Relations: Reflective, Symmetric, Transitive, and Equivalence Relations. Definition of Function, Domain and Range of a Function, Inverse function, Special Functions (Identity, Constant), Algebraic (Linear, Quadratic, Cubic), Trigonometric and Their Graphs. Definition of Exponential and Logarithmic functions, Composite Function. (Mathematica)

#### Unit 3 Application of Differentiation

**8 Hrs.**

The derivatives and slope of the curve; Increasing and decreasing function; convexity of curves; maximization and minimization of a function; Differentiation and marginal analysis; price and output; Competitive equilibrium of firm, Illustrations. Drawing graphs of algebraic function by using first and second order derivatives. (Mathematica)

#### Unit 4 Integration and Its Applications

**8 Hrs.**

Riemann Integral; Fundamental Theorem (Without Proof); Technique of Integration; Evaluation and Approximation of Definite Integrals; Improper Integrals; Applications of Definite Integrals; Quadrate, Rectification; Volume and Surface Integral. Trapezoidal and Simpson's Rules of Numerical Integration. (Mathematica)

**Unit 5 Differential Equations****7 Hrs.**

Differential Equation and its Order and Degree, Differential Equations of First Order and First Degree; Differential Equations with Separable Variables, Homogeneous and Exact Differential Equations.

**Unit 6 Computational Method****10 Hrs.**

Linear Programming Problem (LPP), Graphical Solution of LPP in Two Variables, Solution of LPP by Simplex Method (up to 3 variables), Solution of System of Linear Equations by Gauss Elimination Method, Gauss Seidel Method and Matrix Inversion Method, Bisection method, Newton- Raphson Method for Solving Non-linear Equations. (Excel/Matlab)

**Laboratory Works**

Mathematica and/ or Matlab should be used for above mentioned topics.

**Teaching Methods**

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

**Evaluation**

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

**Text Book**

1. Thomas, G. B, Finney, R. S., "*Calculus with Analytic Geometry*", Addison - Wesley, 9<sup>th</sup> Edition.

**Reference Books**

1. Monga, G. S., "*Mathematics for Management and Economics*", Vikas Publishing House Pvt. Ltd., New Delhi.
2. Upadhayay, H. P., Paudel, K.C & et al, "*Elements of Business Mathematics*", Pinnacle Publication.
3. Budnick, F. S., "*Applied Mathematics for Business, Economics, and the Social Sciences*", McGraw-Hill Ryerson Limited.

4. Paudel, K. C., GC. F. B., and et al, "*Higher Secondary Mathematics*", Asmita Publication & Distributors Pvt. Ltd, Nepal.
5. Bajracharya D. R., Shreshtha, R. M. & et al, "*Basic Mathematics I, II*", Sukunda Pustak Bhawan, Nepal
6. Sthapit, A.B., Bajracharya, P. M. and et al, "*Fundamentals of Business Mathematics*", Buddha Academic Publisheres & Distributors Pvt. Ltd., Nepal
7. Yamane, T. "*Mathematics for Economist*", Prentice-hall of India.
8. Snedden. I., "*Elements of Partial Differential Equation*", Hill Book Company-McGraw.

