Department of Mathematics
Indian Institute of Technology Delhi
MTL 100: Calculus
Course information

Course contents:

Sequences: Real number system, Archimedean Property, Sequences of real numbers: Definitions of sequence and convergence, bounded sequences, limit superior and inferior, Cauchy sequence, divergent sequences.

Differential Calculus: Limits, continuity and differentiability, uniform continuity, mean value theorems, Taylor's theorem, maxima and minima.

Infinite Series: Series of real numbers, absolute and conditional convergence, comparison, ratio and root tests for convergence, power series and Taylor series.

Multivariable Differential Calculus: Functions of several variables, limits, continuity, differentiability, gradient, directional derivatives, chain rule, Taylor's theorem, Maxima & minima and method of Lagrange multiplies.

Definite Integral: Definition of Riemann integral, fundamental theorems, improper integrals of first and second kind, beta and gamma functions, applications to area, arc length, volume and surface area.

Multivariable Integral Calculus: Double and triple integrals, Jacobian and change of variables formula. Applications to Area, Volume, Surface area and surface integrals.

Vector Calculus**:** Vector fields, divergence and curl, line integrals, Conservative vector fields, Tangents & Normals, Parametrization of curves and surfaces, Green, Gauss, Stokes theorems and applications.

Reference books:
1. Methods of Real Analysis, Chapter 2, R. Goldberg (for sequences and series)
2. Elementary Analysis: The Theory of Calculus, K. A. Ross (for sequences, series)
3. Calculus, G. B. Thomas and R. L. Finney, Pearson (multivariable calculus)
4. Differential and Integral Calculus, Volume I&II, N. Piskunov, CBS (all topics).
5. Calculus, James Stewart, Brooks/Cole Cengage Learning (multivariable calculus).

Grading:

There will be two minor examinations of 20% each and one major examination of 40%.

There will be quizzes for 20%

Important guidelines:
1. One Re-minor exam will be conducted in the last week of the course for students who miss minor 1 and/or minor 2 on medical grounds on submission of valid medical certificate duly signed by medical practitioner.
2. You are expected to attend 100% lectures and tutorials.
3. You may contact your lecture teacher and/or tutorial teachers for any difficulties in the course with prior appointment. Tutorial schedule is uploaded on the web-page.

Attendance policy:

75% attendance is mandatory

Course web-page: web.iitd.ac.in/~sreenadh

(Course Coordinator)