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.

Infinite Series: Series of real numbers, absolute and conditional convergence, comparison, Cauchy condensation, ratio, root tests.

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

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

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

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, Tangents & Normals, Parametrization of curves and surfaces, Green, Gauss, Stokes theorems and applications.

Reference books:
1. K. A. Ross, Elementary Analysis: The Theory of Calculus, Springer (for single variable calculus)
2. G. B. Thomas and R. L. Finney, Calculus, Pearson (all topics)

Remark: We recommend the students to read the above-mentioned reference books.
A hand-out lecture notes by Prof. K. Sreenadh can be found in the following link:
http://web.iitd.ac.in/~sreenadh/MTL100/main.html

Grading Policy:
There will be **one minor** examination of 30%, **one major** examination of 40%, and **two quizzes** which carry the remaining 30%(the weightage for the quiz will be announced later).

Tentative examination schedule:

Exam	Date and time	Tentative syllabus
Mock test	December 20 (Monday) at 6:00 pm	NA-to know the online exam procedure
Quiz1	December 23 (Thursday) at 5:45 pm	Sequence and series
Minor	January 9 – 12, 2022 (Refer to institute exam schedule)	Topics: Sequences, series and differential calculus(one variable)
Quiz 2	February 19 (Saturday) at 3:00 pm	To be announced later
Major	March 2 – 6, 2022 (Refer to institute exam schedule)	Entire syllabus

Information about the class:
1. **Live lectures and tutorials** will be conducted using MS teams.
2. **We will use piazza for our additional discussions:**
   Enroll for the same using the link: http://piazza.com/iitd.ac.in/fall2021/mtl100

The access code for the class is "mtl100calculus"

Important note:

1. If you find any difficulty in the course, you should immediately inform your class teacher. So that we will do our best to help you on this.
2. All the course materials will be uploaded in your MS team course group.
3. If you have any problem with the **internet connection**, then you should report the issue to the UG administration immediately and inform the same to your class teacher.

Course Coordinator

S. Sivananthan