



Bharati College
(University of Delhi)
Janak Puri, Delhi- 100058
www.bharaticollege.du.ac.in

Lesson Plan (CORE, Semester II, January, 2023 to June 2023)

Name of Teacher	Dr. Ankit Gupta	Department	Mathematics
Course	B.Sc (H) Mathematics	Semester	Second
Paper	Calculus	Academic Year	2022-23

Learning Objectives

The primary objective of this course is :

- To introduce the basic tools of calculus, also known as ‘science of variation’.
- To provide a way of viewing and analyzing the real-world.

Learning Outcomes

On completion of this course, the student will be able to:

- The notion of limits, continuity and uniform continuity of functions.
- Geometrical properties of continuous functions on closed and bounded intervals.
- Applications of derivative, relative extrema and mean value theorems.
- Higher order derivatives, Taylor’s theorem, indeterminate forms and tracing of curves.

Lesson Plan

Week No.	Theme/ Curriculum	Any Additional Information
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Week 1-4	<ul style="list-style-type: none"> Limits of functions (and sequential approach), Algebra of limits, One-sided limits, Infinite limits and limits at infinity. Continuous functions ($\epsilon - \delta$) approach and sequential continuity) and its various properties on closed and bounded interval $[a, b]$ viz., boundedness and maximum-minimum value theorem, Intermediate value theorem and the preservation of intervals theorem. 	Allocation of Assignment I
Week 5 – 8	<ul style="list-style-type: none"> Uniform continuity of real-valued functions. Differentiability of a function, Algebra of differentiable functions and chain rule. Relative extrema, Interior extremum theorem. 	Test Scheduled (Syllabus upto Relative Extrema)
Week 9 - 12	<ul style="list-style-type: none"> Rolle's theorem, Mean-value theorem and its applications, Intermediate value property of derivatives. Higher order derivatives, Calculation of the n^{th} derivative, Leibnitz's theorem; Taylor's theorem, Taylor's series expansions of e^x, $\sin x$, and $\cos x$. 	
Week 13 - 15	<ul style="list-style-type: none"> Indeterminate forms, L'Hôpital's rule Concavity and inflexion points; Singular points (cusp, node and conjugate point), Tangents at the origin and nature of singular points; Concepts of asymptotes parallel to axes and oblique, Graphing rational functions and polar equations. 	Allocation of Assignment II

References

- Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). John Wiley & Sons Singapore Pvt. Ltd. Reprint (2016) by Wiley India Pvt. Ltd. Delhi.
- Bartle, Robert G., & Sherbert, Donald R. (2011). Introduction to Real Analysis (4th ed.). John Wiley & Sons. Wiley India Edition 2015.
- Prasad, Gorakh (2016). Differential Calculus (19th ed.). Pothishala Pvt. Ltd. Allahabad.
- Ross, Kenneth A. (2013). Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer. Indian reprint

Additional Resources

1. Sarma, R. D; Gupta, Ankit; Singh, Rajesh (2022). Concepts of Real Analysis (1st ed.). Sultan Chand and Sons.

