Course Title:	Metric Spaces
Course Code:	MTL 3233
Course Coordinator	Dr Himani Arora
Credits	04

Evaluation Scheme Total 100 Marks							
Quiz (Total 20 Marks)				Assignment/Project (Total 20 marks) (Minimum Two Assignments or one Project)		Mid-Term	Major Examination	Total
Quiz I (5 marks	Quiz II (5 marks)	Quiz III (5 marks)	Quiz IV (5 marks)			20 marks) (1 ½ Hour Duration)	(40 marks) (3 Hour Duration	100 Marks

WEEKS	TOPICS TO BE COVERED
Week 1	• Definition of metric space • Illustration through various examples • Discrete metric space • Pseudo metric space
Week 2	• Bounded and unbounded metric space • Distance between two sets • Diameter of a set
Week 3	• Open and closed balls • Interior points and interior of a set • Examples and basic results • Open set
Week 4	• Neighborhood of a point • Limit point of a set • Closure of a set • Closed set • Examples and basic results
Week 5	• Boundary points • Exterior points • Subspace of a metric space • Results
Week 6	• Sequences and sub sequences in a metric space • Cauchy sequences • Examples and results
Week 7	• Definition of complete metric spaces

	• Illustration through examples
Week 8	• Relation between completeness and closedness • Basic results
Week 9	• Cantor's intersection theorem • Completion theorm • Dense sets
Week 10	• Separable spaces • No where dense sets • Baire Category theorem
Week 11 (17th -21st March, 2025)	**Mid-Term**
2nd April, 2025	**Showing of Mid-Term Answer Sheets**
Week 13	• Cover of a Metric space • Compact metric spaces • Compact sets and their criterion
Week 14	• Properties of Compact sets • Relation between compactness, completeness and closedness • Finite intersection property
Week 15	• Bolzano Weirstrass property • Sequential compactness • Totally bounded spaces • Continuous functions between two metric spaces.
Week 16	• Characterization of continuous functions • Continuous functions on compact spaces • Uniform continuous function
Week 17 (5th -9th May, 2025)	**Revision Week**
Week 18 (13th – 22nd May, 2025)	**Major Examinations**
29th May, 2025	**Showing of Major Exams Answer Sheets**

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

CO1: learn various natural and abstract formulations of distance on the sets of usual or unusual entities. Become aware one such formulations leading to metric spaces.

CO2: understand the basics notions from metric spaces, namely, completeness and compactness of a metric space

CO3: know about Banach fixed point theorem, whose far-reaching consequences have resulted into an independent branch of study in analysis, known as fixed point theory.

Recommended Books:

1. S. Shirali and H.L. Vasudeva, Metric Spaces, Springer, 2nd edition, 2011.

2. S. Kumaresan, Topology of Metric Spaces, Alpha Science, 2005.

3. P.K. Jain and Khalid Ahmad, Metric Spaces, Alpha Science, 2004.

Calendar of Quizzes/Assignment etc. to be provided as per below details and exact dates to be fixed in consultation with other course coordinators to avoid overlap of Quizzes of different courses.

Component	Date
Quiz-I	27th -31st, January 2025
Quiz-II	24th -28th February, 2025
Assignment-I	10th -12th February, 2025
Mid-Term	17-21st March, 2025
Assignment-II/ Project Submission	21st – 24th April, 2025
Quiz-III	7th – 11th April, 2025
Quiz-IV	28th April-2nd, May, 2025
Major Exam	13th – 22nd May, 2025

Note:

1. One surprise Quiz may be fixed out of Quiz-II, Quiz-III or Quiz-IV.

2. In case of any deviation in evaluation methodology for courses such as AEC/VAC/SEC shall be mentioned accordingly. Thus, same shall be approved by the next BOS of school if not done earlier.

Signature of Course Coordinator   :