Curriculum Delivery
Four-Year Undergraduate Program (FYUP)
Mathematics
Session: 2025-2026

B.Sc. Mathematics (Major) and Skill Enhancement Course				
SEMESTER-III				
Course Code: **MATH-M-T-03**				
Course Title: **Real Analysis-I (Major Course)** and				
Course Code: **MATH-SEC-T-03**				
Name of the teacher	**Paper**	**Unit**	**Subject**	**Classes**
Md. MeezanurRahaman	**MATH-M-T-03**	**2**	● Sequences, bounded sequence, convergent sequence, limit of a sequence, lim inf, lim sup. ● Limit theorems. Sandwich theorem. Nested interval theorem. ● Monotone sequences, monotone convergence theorem. ● Subsequences, divergence criteria. Monotone subsequence theorem (statement only). ● Bolzano-Weierstrass theorem for sequences. ● Cauchy sequence, Cauchy's convergence criterion, Cauchy's 1st and 2nd limit theorem.	10
	SEC-T-03	**1**	● Positional number systems: Binary, octal, decimal, hexadecimal systems. Binary arithmetic. ● BIT, BYTE, WORD. Coding of data -ASCII, EBCDIC, etc. ● Algorithms and flow chart: Important features, ideas about complexities of algorithms. Application in simple problems.	10
Dr. Sarifuddin	**MATH-M-T-03**	**1**	● Review of algebraic and order properties of R. ● Idea of countable sets, uncountable sets and uncountability of R. Countability of Q. ● Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. ● Completeness property of R and its equivalent properties. ● The Archimedean property, density of rational (and irrational) numbers in R, intervals. ● Intervals, ε-neighbourhood of a point in R, interior points, limit points, isolated points, open set, closed	15

			set, union and intersection of open and closed sets. Derived set, closure of a set, interior of a set. ● Illustrations of Bolzano-Weierstrass theorem for sets.	
	SEC-T-03	**2**	● Programming language and importance of 'C' programming. ● Constants, variables and data type of 'C'-Program: Character set. Constants and variables data types, expression, assignment statements, declaration. ● Operation and expressions: Arithmetic operators, relational operators, logical operators. ● Decision making and branching: Decision making with if statement, if-else statement, nesting if statement, switch statement, break and continue statement. ● Control statements: While statement, do-while statement, for statement. ● Arrays: One-dimension, two-dimensional and multidimensional arrays, declaration of arrays, initialization of one and multi-dimensional arrays.	10
Babulal Tudu	**MATH-M-T-03**	**4**	● Limits of functions (ε - δ approach). Sequential criterion for limits. Divergence criteria. Limit theorems, one sided limit. Infinite limits and limits at infinity. ● Continuous functions, neighbourhood property. Sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval. ● Bolzano's Theorem, intermediate value theorem. Location of roots theorem, preservation of intervals theorem. ● Uniform continuity, non-uniform continuity criteria, uniform continuity theorem. ● Differentiability of a function at a point and in an interval, ● Caratheodory's theorem. ● Algebra of differentiable functions. ● Darboux's theorem.	15
Ariful Islam	**MATH-T-03**	**5**	● Rolle's theorem. ● Lagrange's and Cauchy's mean value theorems. ● Taylor's theorem with Lagrange's and Cauchy's forms of remainder. ● Application of Taylor's theorem to convex functions.	15

			● Applications of mean value theorem to inequalities and approximation of polynomials.	
Gaurab Mitra	**MATH-M-T-03**	**3**	● Infinite series, convergence and divergence of infinite series, Cauchy criterion. ● Tests for convergence: comparison test, limit comparison test, ratio test: D'Alembert's ratio test, Raabe's test, Cauchy's root test, Gauss test, integral test, Cauchy's condensation test with examples. ● Alternating series, Leibnitz test. Absolute and conditional convergence.	10
	SEC-T-03	**1**	● Brief historical development. Computer generation. Basic structure and elementary ideas of computer systems, operating systems, hardware and software.	5

BilkisKhatun	**MATH-M-T-03**	**3& 5**	● Alternating series, Leibnitz test. Absolute and conditional convergence.**(U-3)**
			● Relative extrema, interior extremum theorem. ● Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, $\log(1 + x)$, $1 / (ax +b)$, $(1 + x)^n$.
			● Application of Taylor's theorem to inequalities.
			  ❖ Graphical Demonstration (Teaching aid)
			  1) Plotting of recursive sequences. 2) Study the convergence of sequences through plotting. 3) Verify Bolzano-Weierstrass theorem through plotting of sequences and hence identify convergent subsequences from the plot. 4) Study the convergence/divergence of infinite series by plotting their sequences of partial sum. 5) Cauchy's root test by plotting nth roots. 6) Ratio test by plotting the ratio of nth and (n+1)th term.
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