



## Real Analysis

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	311	Real Analysis	4	3	0	2	MAT203

### *Objectives:*

- To give a careful and rigorous treatment of the main ideas of differential calculus which was taught to students in Calculus I and Calculus II .
- To let students gain experience in dealing with axiomatic thinking and concise proofs of calculus.
- To expose students to the rudiments of metric and topological spaces.

### *Syllabus:*

- **Fundamentals:** Elementary set theory, Countable and uncountable sets, The real numbers, Sequence of real numbers.
- **Metric spaces:** Definition, Open set, closed set, Neighborhood, Convergence and divergence of sequences, Cauchy sequences, Completeness, Completion of metric spaces.
- **Continuity and derivative:** Left and right limits, limits, continuity, and uniform continuity. Discontinuity of first and second kind. Variation and fluctuation of a function. Left and right derivatives. Derivatives of functions. Mean value theorem.
- **Riemann's Integral:** The Riemann sum and the Riemann integral. The Fundamental Theorem. First and second mean value theorems. Zero sets and Riemann integrability. The Riemann integral on unbounded set.

### *References:*

- **Elementary Analysis**, K. Ross, Springer Verlag 14<sup>th</sup> ed. (2003)
- **Introduction to Real Analysis**, R Bartle, D. Sherbert, Wiley; 3<sup>rd</sup> ed. (1999).

