Summary of main topics covered in Math 4121

- (1) Chapter 8, Infinite series and Infinite products: Convergent, divergent and Cauchy sequences; lim sup, lim inf; Monotonic sequences; Infinite series, Telescoping series, Cauchy criterion, inserting and removing parenthesis, alternating series, absolute and conditional convergence; Tests for convergence; Rearrangement of series and subseries; Double sequences and series; multiplication of series, Cauchy product, Mertens' theorem; Infinite products, Euler's product for the Riemann zeta function.
- (2) Chapter 9, Sequences of functions: Uniform convergence and its implication for continuity, differentiability and integration; Uniform convergence for infinite series, Cauchy condition, Weierstrass M-test; Dirichlet's test for uniform convergence, Tietze extension theorem, double sequences; Power series, radius of convergence, continuity, differentiability and integrability of power series; Multiplication of power series, inverse of a power series; Taylor's series, Bernstein's theorem, Abel's limit theorem, Equicontinuity.
- (3) Lebesgue integration: (we did not quite follow the book) Look at whatever is covered in my notes-see the latest version. The only part not covered in my notes was a bit about Hilbert spaces and L^2 .
- (4) Chapter 12, Multivariable calculus: Partial derivatives, directional derivatives, total derivative; Jacobian matrix and determinant (you must at least know what these are and able to calculate the determinant of a 2×2 matrix.); Chain rule; Mean value theorem; Sufficient condition for differentiability
- (5) Chapter 13, Implicit function theorem: Implicit and Inverse function theorems.