Linear Algebra:

Vector spaces, linear transformations and matrices, determinants, solution of linear system of equations, eigenvalues, eigenvectors, diagonalizability, triangular form, Jordan canonical form, inner product spaces and linear operators on them.

Topology:

Topological spaces, continuous functions, connectedness, compactness, separation axioms, product spaces, complete metric spaces, uniform continuity, quotient topology.

Real Analysis:

Sequence and series of real numbers and functions, continuity and differentiability of real valued functions of one variable and applications, uniform convergence, Riemann integration, continuity and differentiability of functions of several variables, partial derivatives and mixed partial derivatives, inverse and implicit function theorems.

Complex Analysis:

Holomorphic functions, Cauchy's theorem and Cauchy integral formula, Morera's theorem, open mapping theorem, Weierstrass convergence theorem, maximum modulus theorem, Schwarz lemma, Mobius transformations, Laurent series, singularities, theory of residues, contour integration, Riemann mapping theorem.

Measure Theory:

Lebesgue integral, basic convergence theorems-- monotone convergence theorem, Fatou's lemma and dominated convergence theorem, measurability in product spaces, product measures, Fubini and Fubini-Tonelli theorems, polar coordinates and change of variable theorem.

Functional Analysis:

Banach Spaces, Hilbert spaces, L^p -spaces, bounded linear maps and linear functionals, uniform boundedness principle, open mapping theorem and closed graph theorem, Hahn-Banach extension theorem, dual spaces, Riesz representation theorem, reflexivity, weak topologies, weak convergence, weak compactness, Banach-Alaoglu theorem, adjoints and compact operators, spectrum, spectral theory of compact self-adjoint operators.