Syllabus for Analysis Preliminary Exam
(Based on MATH 675: Linear Analysis I)

Metric Spaces: Open and Closed Sets. Continuity. Convergence. Completeness. Baire's Theorem. Completion of a Metric Space. Contraction Mappings. Compactness and total boundedness. [KF, Ch. 2, Sections 5, 6, 7.1, 7.4, 8.1, Ch. 3, Sections 11.1, 11.2].

Linear Spaces: Convex sets and functionals. Hahn-Banach Theorem. Normed linear spaces. Euclidean spaces. Complete orthonormal systems. [KF, Ch. 4, Sections 13-16].

Linear Functionals: Continuous linear functionals. The conjugate space of a normed linear space. Hahn-Banach theorem for a normed linear space. [KF, Ch. 5, Sections 18, 19.1, 19.2].

Linear Operators: Continuity and boundedness. Inverse and adjoint operators. The Open Mapping (Banach) Theorem. Completely Continuous (Compact) operators. Hilbert-Schmidt theorem. [KF, Ch. 6, Sections 22-24].

[KF] Kolmogorov, A. N, and Fomin S. V., *Introductory Real Analysis*, Dover 1970 (ISBN 0-486-61226-0)

If a subsection of a chapter is listed with no further enumeration then the entire subsection is included. If it is listed with an enumeration then only those sub-subsections listed are included.