PMATH 453/753 , FALL 2019: SYLLABUS

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This is an <u>approximate</u> outline of topics we will cover.

- Normed/Banach spaces: $\mathcal{C}_b(X)$, Lipschitz spaces, ℓ_p spaces; spaces of linear operators and dual spaces. Topological spaces.

- Dual spaces: Hahn-Banach theorem, separation by hyperplanes.

- Consequences of Baire category theorem: Banach-Steinhaus theorem, open mapping theorem, closed graph theorem.

- Weak topologies, product topologies: compactness, Tychonov's theorem, Banach-Alaoglu theorem, metrisation; second dual spaces: Goldstine's theorem, reflexivity; Krein-Milman theorem.

- Euclidean/Hilbert spaces: Cauchy-Schwarz inequality, Orthogonal decomposition, Riesz representation theorem, orthonormal systems and orthonormal bases.

- Linear operators on Banach spaces: adjoint operators, Gelfand spectrum.

- Compact operators: spectral theorem.

Use of text: We will aim to cover, in whole or in part, Chapters 1-5, 8-14 in the text *Linear Analysis*. I will supplement some of the topological material required.