

PMATH 810: Banach Algebras

Winter 2023

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Content. I will cover all of the basic topics:

- Basic examples, $\mathcal{C}(K)$, $\mathcal{C}_0(X)$, $\mathcal{A}(\Omega)$, $L^\infty(X, \mu)$, $\mathcal{C}^1[0, 1]$, $\ell^1(S)$, $\mathcal{B}(\mathcal{X})$, $L^1(\mathbb{R})$.
- invertibles and spectral theory
- commutative Banach algebras
- holomorphic functional calculus
- compact and Fredholm operators
- C^* -algebras: Gelfand-Naimark-Segal construction
- von Neumann algebras: double commutant theorem, Kaplansky's density theorem
- spectral theorem for normal operators on Hilbert space

Assessment. 4-5 Assignments: %80; talk: %20.

Texts. The course will be self-contained and no text is required. I expect to be using material adapted from many books, including:

W. Arveson, *An invitation to C^* -algebras*

B. Bollobas, *Linear Analysis*

J. B. Conway, *A Course in Functional Analysis*

K. R. Davidson, *C^* -algebras by Example*

J. Dixmier, *C^* -algebras*

J. Dixmier, *von Neumann algebras*

G. B. Folland, *A course in abstract harmonic analysis*

E. Hewitt and K. A. Ross, *Abstract Harmonic Analysis I*

E. Hewitt and K. A. Ross, *Abstract Harmonic Analysis II*

E. Kanuith, *A Course in Commutative Banach Algebras*

L. Loomis, *An Introduction to Abstract Harmonic Analysis*

L. W. Marcoux, *An Introduction to Operator Algebras*, (unpublished)

G. K. Pedersen, *Analysis Now*