Functional Analysis

Thomas Rey

1. Theory of bounded and unbounded operator: the open mapping and closed graph theorems, left and right invertibility of linear operators, unbounded operators and their adjoint, operator with closed range.
2. Weak topologies: coarsest topology for continuity, reflexive spaces, separable spaces.
3. An introduction to the theory of distributions: introduction on generalized functions, operations on distribution, consistency of derivatives, Fourier transforms.
4. Integration and the L^p spaces, convolution.
5. Riez-Fredholm Theory, Spectral decomposition, Compact operators.
6. Applications to PDEs.

References:

1. Brezis: Functional Analysis, Sobolev Spaces and Partial Differential Equation, Spring 2011
2. Strichartz: A Guide to Distribution Theory and Fourier Transforms, CRC Press 1994
3. Rudin: Functional Analysis, 1991.