

1. Geometry of the Hilbert space
Projection into a subspace
2. Compact sets (see KF vol1, p51-57)
Compact set in $C[a, b]$.
Linear functionals in normed spaces.
Hahn-Banach Theorem
Linear functionals in the Hilbert space (AG 58-63)
Bounded linear operators(AG 67-73)
3. Bilinear forms
Adjoint operator
Compact operators
Hilbert-Schmidt operators (AG 95-97)
Spectral theorem for compact operators (F.Riesz, B.Sz.-Nagy, p 227-244)
4. Projection operator
Unitary and isometric operators
General concepts and theorems in the theory of linear operators (See AG pp 120-131)
Closed operators
5. Invariant subspaces and reducibility of linear operators (See Birman, Solomyak pp. 75-81)
Self-adjoint operator
6. Spectrum and resolvent
7. Spectral theorem for unitary and self-adjoint operators.
Spectral measure, The resolution of the identity

8. The extension theory for symmetric operators.
Quasi resolvent set, deficiency indices
Deficiency indices for symmetric and isometric operators
Cayley transform
Von Neumann's formulas
9. Krein's formula
10. Perturbation theory for self-adjoint operators
11. Elements of scattering theory
Wave operators.
12. Singular perturbations
13. Spectral theory for one-dimensional Schrödinger operator.