Metric Spaces
- Metric spaces, open and closed sets, convergence of sequences, completeness, compactness
- Continuous functions, uniform continuity, uniform convergence of functions.
- Baire category theorem and applications

Measure and Integral
- measure and outer measure on abstract measure spaces
- Lebesgue outer measure, Lebesgue measurable sets, Lebesgue measure in $\mathbb{R}^n$
- Lebesgue-Stieltjes measure $dg$ for a function $g$ of bounded variation
- signed measures, Hahn and Jordan decomposition theorems
- measurable functions, integral of a measurable function with respect to a measure
- Monotone Convergence Theorem, Fatou’s lemma, dominated convergence theorem
- Lebesgue integral, Lebesgue-Stieltjes integral
- characterization of Riemann integrable functions, equality of Lebesgue and Riemann integrals
- Radon-Nikodym theorem, Lebesgue decomposition theorem
- convergence in measure, Egorov’s theorem, Lusin’s theorem
- Fubini’s theorem, Tonelli’s theorem

Differentiation
- Vitali covering theorem, Dini derivates, derivatives of monotone functions, derivatives of indefinite integrals
- functions of bounded variation, absolutely continuous functions, the Cantor-Lebesgue function, characterization of absolutely continuous functions as the integrals of their derivatives

$L^p$ spaces
- Hölder and Minkowski inequalities
- Banach spaces, separability of $L^p$, completeness of $L^p$
- $L^p$ duality (representation of linear functionals on $L^p$)