The contents of real analysis at the University of Göttingen are listed below.

Courses that contain these topics will be counted towards your Master's Degree application in the area "real analysis", only. This means they count up to at most 16 ECTS.

Contents of real analysis:

1. Logic. Sets, equivalence relation, inequalities and orderings, maps.

2. The real numbers. Supremum and infimum. Monotone sequences. Convergence of sequences, Chauchy sequences. Real numbers are complete.

3. Continuity of real functions. Intermediate value theorem. Inverse functions. Convergence and uniform convergence of function sequences. Direct comparison test.

4. Differentiability of real functions. Mean value theorem. Taylor's Theorem. Find minimum and maximum values.

5. Series, absolute and conditional convergence. Geometric series, harmonic series. Critieria for convergence. Series of functions, component wise differentiation and integration. Powerseries, radius of convergence.

6. Elementary functions: exponential map, trigonometric functions, their inverses.

7. Integrals Fundamental theorem of calculus. Antiderivative. Improper integrals. Tools: partial integration, substitution. Leibniz' Rule for integrals.

8. Topological spaces, continuity, compactness. Metric spaces, completeness. Banach fixed point theorem. Normed vector spaces.

9. Differential maps, partial differentiation. Taylor 's Theorem. Inverse function theorem. Implicit function theorem. Extreme values, Lagrange multipliers.

10. Lebesgue integral. Dominated convergence theorem. Transformation formula. Fubini's Theorem.

11. Submanifolds of R^n. Integration over submanifolds. Gaussian integrals.

12. Ordinary differential equations. Local existence and uniqueness. Linear differential equations and systems of linear differential equations. Fundamental solutions. Variation of constants. Linear differential equations with constant coefficients.