

Math 131B: General Course Outline

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Catalog Description

131B. Analysis. (4) Lecture, three hours; discussion, one hour. P/NP or letter grading. Requisites: courses 33B, 115A, 131A. Derivatives, Riemann integral, sequences and series of functions, power series, Fourier series.

Textbook

Apostol, *Mathematical Analysis (2nd)*, Addison

Reviews & Exams

The following schedule, with textbook sections and topics, is based on 26 lectures. The remaining classroom meetings are for leeway, reviews, and midterm exams. These are scheduled by the individual instructor. Often there are midterm exams about the beginning of fourth and eighth weeks of instruction, plus reviews for the final exam.

Schedule of Lectures

Week	Section	Topics
1	12.1, 12.2, 12.3	Metric Spaces, Some Point-Set Topology and Relative Topology
2	12.4, 12.5, 13.1	Cauchy Sequences and Completeness, Compact Metric Spaces, Continuous Functions on Metric Spaces
3	13.2, 13.3, 13.4	Continuity on Product, Connected and Compact Metric Spaces
4	14.1, 14.2	Uniform Convergence, Midterm I
5	14.3, 14.5, 14.6, 14.7	Uniform Convergence and Continuity, the "Sup" Norm, Series of Functions, Uniform Convergence in Integration and Differentiation ³
6	15.1, 15.2, 15.3, 15.4	Formal Power Series, Real Analytic Functions, Abel's Theorem (Optional) ⁴ , Multiplication of Power Series
7	15.5, 15.6, 15.7, 16.1	Exponential and Logarithmic Functions, Trigonometric Functions, Periodic Functions
8	16.2, 16.3	Inner Products on Periodic Functions, Trigonometric Polynomials, Hour Exam II
9	16.4, 16.5, 17.1, 17.2, 17.3 ⁵	Periodic Convolutions, L^2 convergence of Fourier Series and Plancherel's Theorem, Differentiability of Functions of Several Variables
10	17.4, 17.5	The Several Variable Chain Rule, Clairaut's Theorem, Review of Course

Comments

³ Section 14.8 is the proof of the Weierstrass Approximation Theorem. This should probably be left for the Honors Section.

⁴ This is rather difficult, but it introduces summation by parts. Using summation by parts to prove Dirichlet's Test (and hence the Alternating Series Test) is an alternative to Abel's Theorem.

⁵ This is a lot, but Sections 17.1 is just a review of linear transformations and 17.2 and 17.3 contain only one theorem.

Outline update: J. Ralston, 4/08

For more information, please contact Student Services, ugrad@math.ucla.edu.