UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

Mathematics 545 Analysis III

(see Section 3.5C of Faculty of Science www.ucalgary.ca/pubs/calendar/current/sc-3-5.html and Course Descriptions: http://www.ucalgary.ca/pubs/calendar/current/course-main.html)

Syllabus

Topics	**Number of hours**
Sequences and series of functions; pointwise and uniform convergence; Weierstrass M-test	3
Differentiation and integration of series; power series	3
Step functions and their integrals; integration of limits of increasing sequences of step functions	3
The Lebesgue integral and its basic properties; sets of measure zero	3
The monotone and dominated convergence theorems; Fatou's lemma	3
Functions defined by integrals and differentiation under the integral sign; Fubini's theorem	3
Square-integrable functions; completeness of L^2; Hilbert space axioms	3
The Hilbert space l^2; Fourier series as an isometry of L^2 with l^2; self-duality of Hilbert spaces	3
The Fourier series of a function; Parseval's formula; the Riesz-Fischer theorem; The L^2-density of trigonometric polynomials, Riemann-Lebesgue lemma	3
Pointwise convergence of Fourier series	3
The Fourier transform and its properties; the Fourier integral theorem	3
Convolution and the Fourier transform; the Laplace transform; applications to differential equations	3
Further topics, e.g., the Dirac delta function and its Fourier transform (time permitting)	
TOTAL HOURS	**36**

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