UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

Mathematics 603 Analysis III

Calendar Description: sequences and series of functions, Lebesgue integration on the line, Fourier series and the Fourier transform, pointwise convergence theorems, distributions and generalized functions.

Prerequisites: Mathematics 447 or a grade of "B+" or better in Mathematics 445 or consent of Department

Antirequisite: Pure Mathematics 545 and Mathematics 545

Textbook: W. Rudin, Real and Complex Analysis

(see Course Descriptions under the year applicable: http://www.ucalgary.ca/pubs/calendar/)

Syllabus

Topics:	**Number of Hours**
Sequences and series of functions, pointwise and uniform convergence, Weierstrass M-test	6
Step functions and their integrals, integration of limits of increasing sequences of step functions, the Lebesgue integral and its basic properties, sets of measure zero, the monotone and dominated convergence theorems, Fatou's lemma, functions defined by integrals and differentiation under the integral sign, Fubini's theorem, square-integrable functions, completeness of L^2, L^p spaces, Hilbert space axioms, the Hilbert space l^2, Fourier series as an isometry of L^2 with l^2, Riesz representation theorem, self-duality of Hilbert spaces.	15
The Fourier series of a function, Parseval's formula, the Riesz-Fischer theorem, the L^2-density of trigonometric polynomials, Riemann-Lebesgue lemma, pointwise convergence of Fourier series.	6
The Fourier transform and its properties, the Fourier integral theorem, distributions, convolution and the Fourier transform, the Laplace transform, applications to differential equations.	9
TOTAL:	**36**

Time permitting, may include Arzela-Ascoli theore, construction of nowhere differentiable functions, Dirac delta function and its Fourier transform, etc.

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