



Applied Mathematics 415

Mathematical Methods

(see Course Descriptions for the applicable academic year: <http://www.ucalgary.ca/pubs/calendar/>)

Syllabus

Topics

**Number
of Hours**

Complex numbers. Limits. Continuity. Differentiability. Analytic functions.
Elementary functions. Real integrals of complex functions.

4

Trigonometric polynomials. Approximation by trigonometric polynomials. Fourier
series. Discrete Fourier transform

8

Complex integrals. Cauchy's integral theorem. Cauchy's integral formula.

4

Series of real and complex functions. Convergence tests. Taylor, McLaurin, Laurent
series. Properties of zeros and poles.

5

Sequence spaces. The z-transform and its inverse. Discrete linear systems and
filters. Convolution. Frequency analysis. Special purpose filters.

7

Improper integrals. Continuous linear systems and filters. Integration by the method
of residues. Laplace and Fourier transforms and their inverses. Frequency analysis.
Special purpose filters.

8

TOTAL HOURS

36

AMAT 415: Mathematical Methods

Course Outcomes:

By the end of this course, students will be able to:

1. Manipulate complex numbers expressed in Cartesian or polar form.
2. Describe what it means for a complex function to be differentiable; list examples of differentiable and non-differentiable functions; list (or compute) series expressions for a range of standard examples.
3. List and describe the Cauchy theorems relating to complex integration.
4. Compute complex residuals for various classes of functions and use them to compute contour integrals.
5. Compute approximations to functions using trigonometric polynomials; describe the relationships between these, Fourier series and the Discrete Fourier Transform.
6. Define the z-transform of a sequence, compute convolutions, and describe properties of discrete linear systems using frequency analysis.
7. Define and calculate Laplace and Fourier transforms of a range of functions and describe their use in the analysis and design of continuous linear systems.

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16:11:02

Prerequisite change made 08:07:01

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