



Applied Mathematics 411

Differential Equations II

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

*Syllabus*

Existence, uniqueness and continuity theorems. Singular solutions.

Comparison and Oscillation theorems.

Green's functions.

Sturm-Liouville Problems.

Systems of Differential Equations.

Linear systems. Matrix exponentiation.

Stability and Phase portraits.

Optional additional topics: Integral equations; Difference equations; Solutions of Partial Differential Equations.

## AMAT 411: Differential Equations II

### COURSE OUTCOMES

Upon Successful Completion of the Course, Students will be able to:

1. Use hypotheses to construct a logical argument and draw conclusions concerning local existence, uniqueness and continuity of solutions to a well-posed first order initial value problem.
2. Apply Sturm Separation & Comparison theorems to analyze the oscillatory or non- oscillatory nature of solutions to second order linear differential equations and to estimate the number of zeros of a solution in a given interval.
3. Employ the Technique of Green's function to obtain solutions to a well-posed Boundary value Problem.
4. Implement matrix technique to solve a system of linear, first order differential Equations.
5. Master (and distinguish between) the techniques of obtaining eigenvalues and corresponding eigenfunctions of a Regular, Singular or Periodic Sturm-Liouville System and assemble an Eigen Function expansion.
6. Determine the Type and Stability of equilibria of a Linear , Linearized , or Non-Linear autonomous system and retrieve relevant knowledge from a phase portrait.

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Prerequisite change made 03:07:02

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