MATH235—Differential Equations with Honors

Course Description

Classical techniques for first and higher order differential equations and systems of equations. Laplace transforms. Phase plane and stability analysis on nonlinear equations and systems. Applications to physics mechanics and electrical engineering and environmental science.

Learning Outcomes

1. Construct models associated with natural/physical phenomenon such as, biological populations, classical/quantum oscillations. Analyze and explain their predictions. Summarize and critique the models. Recommend and support modifications.
2. Solve first and second order linear ordinary differential equations using classical techniques such as Integrating Factors, the Method of Undetermined Coefficients, Laplace Transforms and eigen-decomposition and interpret the solutions in both phase and state space.
3. Apply the concepts of linearity, superposition and existence and uniqueness of solutions to solve linear differential equations.
4. Apply the apparatus of linearization, nullclines, conservations and dissipation of solutions to solve linear and nonlinear differential equations.

Course Highlights

What does this have to do with radio transmission?

How is this related to the factorial function?

How is this related to free fall in a gravitational field?

What does this have to do with RSA encryption?

I gained “An appreciation for the duality in math. A ‘simple-to-write-down’ nonlinear equation can capture so much more behavior than its symbols would let on, all the while being likely impossible to solve explicitly.”

“It showed me that mathematics is not just about computation, but about developing a variety of tools with which you can gain valuable insight to a problem.”

Student Experience

Weblog: http://scottastrong.wordpress.com/category/differential-equations

Quick Facts

Section A: 11:00am, MWF
Section B: 12:00pm, MWF:
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