

Fairleigh Dickinson University
Gildart Haase School of Computer Sciences and Engineering
Differential Equations Project Description and Outline
Math 2210.21
Fall 2018

As the first step in completing your Differential Equations writing project, you will be required to submit a hard copy of a typewritten summary containing your project description, project outline, and a corresponding reference list of at least **two peer-reviewed sources**. Minimally, an acceptable project description must be a carefully constructed complete sentence with a focus narrow enough to treat fully in a 5-7 page paper. The project outline should include a bulleted list of points that refer to the appropriate reference(s) listed.

You may not use non-refereed Internet or popular magazine sources for this assignment. For the final draft of your paper, you will be asked to provide copies of the portions of your sources used. If your project description is not approved, you will be required to resubmit this assignment. **Projects submitted without an approved description will not be graded.**

The project description, outline, and reference list are due in class on **Thursday, November 15th, 2018**. The due date for your final project submission is **December 6, 2018**. Student projects should all be substantially different and done independently. Examples of possible topics are listed below.

Sample Topics

- 1) Lorenz equations (chaos)
- 2) RLC circuits
- 3) Projectile motion with wind resistance
- 4) Predator-prey models
- 5) Solutions to differential equations involving special functions (Airy equation, Bessel equation, Hermite equation, etc)
- 6) Fourier series solutions to linear ODEs
- 7) Double pendulum problem
- 8) Linear stability of dynamical systems
- 9) Kepler's laws
- 10) Quantum harmonic oscillator equation and solutions
- 11) Reduction of partial differential equations to systems of ordinary differential equations (e.g. method of separation of variables)
- 12) Sturm-Liouville boundary value problems and solutions
- 13) Numerical approaches to solving initial or boundary value problems
- 14) ODE models of epidemics (e.g. spread of disease)
- 15) Alternatives to Newton's law of cooling model for time-of-death estimation (e.g. Rainy's method, Marshall & Hoare model, etc.)