MAT267: Essay

If you would like to write a 5-10 page essay or report on an aspect of ODEs, here's a guide as to what you'd need to do.

While you can simply write an essay describing an application of ODEs, your work will be stronger if you apply some of the methods from this class to simple cases in addition to reporting the work of others. Alternately, if you're interested in doing some sort of exploration of a topic on your own (something we might have done in the course if there were a second semester) that would also be fine.

Below there's a list of the essay/report titles from the 2019 MAT267 students. I'm not suggesting these as specific topics; I'm providing them to demonstrate the wide variety of possible topics.

By April 10: Think of some topics. Try googling them; you might be surprised by the various places where ODEs show up. Just google, "ODEs and X" where X is a topic you're curious about. Also try "differential equations and X". You'll likely find things like slide decks from talks, lecture notes, research articles, pointers to books and the like. Once you've found one or two topics that seem interesting, send me an email with the topics and the sources you're looking at. I'll give you feedback.

By April 17: You'll have done some of the reading on your topic by this date. By this date, send me a 2-3 page outline of what you're thinking about doing. I'll give you feedback.

By April 22: You'll submit the first draft of your essay/report by this date. It should be at least 4 pages long. I'll give you feedback.

By 11:59pm, April 25: You'll submit the final draft of your essay/report by this time. It should be 5-10 pages and must include references to all the sources you used in your work. If you did any computer explorations, you should provide the source code (not included in page count).

Essay/Report topics from MAT267, Winter 2019

- Perturbation & Variation Methods in Quantum Differential Systems
- Curvature and Torsion of Curves
- A Model for Epidemics
- The Schrödinger Equation - The Differential Equation of Quantum Mechanics
- Energy Conservation in Numerical Solutions to ODEs
- The n-Body Problem of Classical Mechanics with Emphasis on n = 2, 3
- The Cauchy-Euler Equation
- Symmetry Methods in Differential Equations
- Harmonic Functions
- Modelling the changes in tropical forests caused by selective logging using ODEs
- Ordinary Differential Equations on Manifolds
- The Friedmann Equations
- The Kortewegde Vries equation for surface and internal waves

- the Brachistochrone Curve
- Ever wondered how a bike works? No? Well here are some facts anyway.
- The Adjoint Sensitivity Method
- Symmetry and Conservation (Or: An Excuse to Do Group Theory in ODEs)
- Computability and ODEs
- High Dimensional Nonlinear Systems in Differential Geometry
- Origami in the Maths
- The KdV equation and solitons
- Ladder Operators
- Applications of ODEs in Economics
- Meditation on a simple problem of Boundary Layer theory an Essay
- How to Tune a Violin
- The dosing of chemotherapy for cancer patients
- The Butterfly Effect
- An overview of Galois Dream: Group Theory and Differential Equations
- The use of ODEs in Models of Economic Growth
- Let's chat about dynamical systems and consciousness.
- Legendre equation and Legendre polynomials
- Solow-Swan Model For Economic Growth
- Integration in Elementary Terms
- Can I use circuits to do my MAT267 homework?
- Solving ODEs using contact geometry method
- Topological Classification of Flows
- Damped Pendulum Problem from a Numerical Perspective
- Application of ODE in Statistics
- The Stability of An Inverted Pendulum
- One of the Basic Epidemiological Models SIR Model