MATH 5405/MAT 5131 Ordinary Differential Equations  
Fall 2019

Instructor  
Dr. David Amundsen

Office  
4259 HP, ext. 2135

Email  
dave@math.carleton.ca

Office Hours  
2:30-3:30 Tuesdays and by appointment.

Web page  
http://mathstat.carleton.ca/~dave/

Texts  

[P] Differential Equations and Dynamical Systems  
L. Perko (Springer-Verlag)

[W] Ordinary Differential Equations  
W. Walter (Springer-Verlag)

Lectures  
Tuesday and Thursday 1:00-2:30.

Assignments  
There will be five sets of assigned work, given roughly bi-weekly. Discussion with classmates is permitted however write-ups are to be done individually.

Midterm  
Midterm exam will be given in class on Thursday Oct. 31.

Final  
Cumulative final given at end of term. This may be counted towards the Basic Comprehensive requirement in PhD programs.

Grading  
Assignments: 30 %  
Midterm: 20 %  
Final: 50 %

Topics

- Review of Methods for solving ODEs, Physical Motivations
- Tools from Functional Analysis [W]
- Existence and Uniqueness for IVPs, Continuous Dependence on Initial Conditions [P,W]
- Linear and Nonlinear Systems (IVPs) [P]
  - Qualitative Analysis
  - Periodic Solutions, limit cycles, Poincaré-Bendixson Theorem
  - Floquet Theory
  - Invariant manifolds and hyperbolic theory
- Boundary and Eigenvalue problems [W]
  - Green’s functions
  - Sturm-Liouville Theory
  - Eigenfunction expansions