

# MATH 4816/5806 – Numerical Analysis for Differential Equations – Winter 2022

**Instructor:** Dr. Lucy Campbell

**Office hours:** in **Brightspace** (<https://brightspace.carleton.ca>)

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**Web-page:** <http://www.math.carleton.ca/~campbell>

**Lectures:** Tues/Thurs, 10:00-11:30 AM, starting Tuesday January 11, in **Brightspace**

The lectures will be pre-recorded and asynchronous, but office hours will be held at this time.

**Course information:** <http://www.math.carleton.ca/~campbell/MATH5806>

## **Tentative list of topics:**

- Preliminaries: Floating pointing arithmetic, error analysis.
- Numerical solution of ordinary differential equations.
- Finite difference methods applied to elliptic PDEs: Poisson's equation.
- Finite element methods.
- Overview of direct and indirect methods for solving systems of linear equations.
- Finite difference methods applied to PDEs of evolution.
- Spectral methods.

## **References:**

A list of reference textbooks will be given in **Brightspace**

## **Formal prerequisites for Carleton undergrads registering for MATH 4816:**

MATH 2454 and MATH 3806, or permission of the School. If you do not have these two courses, but you have the general background requirements given below, you may be able to take the course, but would need my permission to have an override to register.

## **General background requirements for everyone taking MATH 4816 or MATH 5806:**

Linear algebra (MATH 1107 or equivalent) and differential equations (MATH 1005, 2454 or 3008 or equivalent), knowledge of MATLAB or any programming language. Basic knowledge of complex analysis would be helpful though not required.

## **Grading scheme:**

The final grade will be calculated as:

40% Assignments,

30% Midterm written exam,

30% End-of-term take-home exam.

**Winter Break:** There will be no classes from Feb 21–25.

## **Academic Accommodation:**

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodation in this course, please contact the PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodation for the formally-scheduled exam (if applicable).

For pregnancy or religious obligations, write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.