Course description

This course serves as an introduction to differential equations with a focus on solution techniques, transforms and modelling. Topics include first and second order linear ordinary differential equations, systems of first order linear differential equations, Laplace transforms, Fourier series and separation of variables for linear partial differential equations.

References (texts, course notes)

The course does not follow a particular textbook. An online textbook and a hardcopy textbook are listed on the Textbooks and course notes page here on Canvas (with links). The course is structured around lecture notes prepared by Laurent MacKay. A rough breakdown is:

- 1st order linear DE's (~3 hours)
- 2nd order linear DE's (~7 hours)
- Laplace transforms (~5 hours)
- Systems of linear DE's (~6 hours)
- Fourier series and simple BVP's (~3 hours)
- Heat/diffusion, wave and Laplace's equations/separation of variables (~9 hours)

Marking scheme

- Assignments - 10%
- 2 Midterm exams - 20% each
- Final exam - 50%

Homework

Homework for the course will come in two forms: (1) written assignments, and (2) Jupyter assignments

Written assignment guidelines

- For each written assignment, you will **upload a scan** of your written work in a **.pdf format** to Canvas.
- Using a **tablet with a writing app is fine** as long as you can export as a **well-formatted pdf that appears as a letter sized page**. Points may be deducted for quirky difficult-to-navigate submissions.
- Your work must be **legible and well-organized** enough for the markers to be able to read it and follow your logic without hesitation.
- You must use a scanner or scanning mobile app to create a single small (<10MB) pdf file that has even lighting. Do not take jpg pictures and glue them together in Word. These tend to be difficult-to-read grey-scale images that are sometimes ridiculously large (100+MB). (video scanning demo)
- Use letter-sized paper. Do not use graph paper unless the lines are not visible once scanned. You can use a tablet or similar to write up your answers provided your submitted pdf consists of separate letter-sized pages.
- The TAs have been instructed to deduct 1 or 2 points for not adhering to these guidelines.

Jupyter assignment guidelines

- There are 5 homework assignments that have computational components in Python/Jupyter. The goal is for students to learn more about the content of the course through computation.
- There will be a Zoom introductory lecture on Python and Jupyter on January 12 from 5-6 pm. The first Jupyter assignment is due 10 days later. We will review everything we need to know to complete the Python assignments. The lecture will also be recorded and available to view on the Zoom page.

- We will review everything we need to know to complete the Python assignments. The lecture will also be recorded and available to view on the Zoom page.
- For each assignment, you will need to download a Jupyter notebook file, follow the instructions in the notebook to fill it in with your own work, then upload it back to Canvas.
- Login to Syzygy to get started with Python and Jupyter in browser. You may also use any other Jupyter development environment that you prefer.
- See Python for UBC Math for examples and resources.
- Visit Python/Jupyter TAs in the Math Learning Center.

Midterm dates, times, and locations:

The midterms will be held in your usual lecture room during class time on the following dates:

- Midterm 1: will cover 1st and 2nd order DE's and Laplace transforms. For Section 201 the midterm is on February 26th, and for Sections 202 & 203 on February 25th.
- Midterm 2: will cover systems of DE's as well as some PDE's. For Section 201 the midterm is on March 26th, and for Sections 202 & 203 on March 25th.

Midterm coverage will be the same across all sections, but actual midterms will be different.

Missing midterms, exams, late homework

If you are unable to attend the midterm, you must notify your instructor before (preferred) or within two days after (in the case of emergencies) the exam date. In either of these two cases (and only in these two cases), suitable accommodations will be made. Generally, your final exam mark will be used in place of the missing midterm mark. Undocumented absence from the midterm will be given a score of zero.

The written homework will be due on the specified due dates at 11:59 pm. It is possible to submit up to one hour late without penalty but neither exceptions nor extensions beyond that will be granted.

DO NOT make any travel plans for April until the exam schedule is announced as no accommodation will be made for students unable to attend the final exam due to conflicting plans. Note that the exam period is densely packed and your exams could be scheduled any day of the week.

Prerequisites

- First year calculus (MATH 100/101 or equivalent)
- Linear algebra (MATH 152, MATH 221 or MATH 223)
- Co-requisite: Multivariable calculus (MATH 200, MATH 217, MATH 226, MATH 253 or MATH 263)