Course syllabus

Course details

Course code:	MATH 215 - 20M
Instructor:	Prof Eric Cytrynbaum
Time:	MWF 12-1
Location:	LSK 121
Office hours:	TBA
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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, and systems of nonlinear ordinary differential equations.

Note: MATH 215 Section 20M is coordinated with MATH 210 Section 20M. This section includes a project which combines key concepts from mathematical computing and differential equations.

Learning objectives

- Solve first and second order differential equations of various types and systems of first order equations.
- Demonstrate understanding and apply basic theory of ODEs (e.g. existence and uniqueness of solutions).
- Write down ODE models of simple physical or biological phenomena and interpret solutions of those ODEs.
- Use qualitative methods to determine the behaviour of solutions to ODEs without solving them.

Marking scheme

- Quizzes (four of them) - (a) 40% or (b) 60%
- Project (shared with MATH 210-20M) - 5%
- Final exam - (a) 55% or (b) 35%

Quizzes

There will be four in-class quizzes, held on Fridays. The quizzes will cover the material not yet covered by a previous quiz up until the content covered one week prior to the date of the quiz (see Course calendar).

Project

The project is combined with MATH 210-20M and integrates content from both courses. You will work on the project in groups of 2-3 students with some time in class being available to work together. There will be three submissions throughout the term with due dates listed on the **Course Calendar (https://canvas.ubc.ca/courses/131800/pages/course-calendar-2)** . The project details and submission will be available on the MATH 210-20M Canvas site.

Homework

Homework for the course will not count toward your final grade in the course. It will come in two forms:

(1) WeBWorK assignments that are auto-marked and

(2) written assignments (scanned or created electronically and uploaded) that are marked with feedback but not points.

Doing homework (yourself) is critical to learning the material in this course - working with peers is ok but must be supplemented with independent practice.

WeBWorK assignments are accessed and completed using the WeBWorK menu link. Written assignments are accessed and submitted on Canvas.

Missing quizzes

If you are unable to attend a quiz you must notify your instructor before (preferred) or within two days after (in the case of emergencies) the quiz date. Medical notes are not required. In either of these two cases (and only in these two cases), suitable accommodations will be made. If a request for accommodation is approved and accommodations have not been made for previous quizzes, your final exam mark will be used in place of the missing quiz mark. Undocumented absence from a quiz will result in a score of zero on that quiz.

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 your exams could be scheduled any day of the week.

Getting help

There are a number of resources available for getting help with course material. These include

- office hours,
- the textbook,
- Piazza, the online discussion forum for the course,
- the YouTube playlist for the course (and other videos online),
- posted practice problems with solutions,
- The Math Learning Centre.

Textbook

The recommended textbook for this course is Jiří Lebl's online textbook ***Notes on Diffy Qs - Differential Equations for Engineers (http://www.jirka.org/diffyqs/)***. We will not follow it exactly but everything we cover will be either in there or covered in online videos. If you prefer to have a physical book, any recent edition of Boyce and DiPrima's *Elementary Differential Equations and Boundary Value Problems* would be suitable.

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)
- Students in this section of MATH 215 must also be registered in MATH 210. Those not registered in both will be removed from the course.

Course schedule

Week 1 - First order ODEs

Week 2-4 - Second order ODEs and applications

Week 5-7 - Systems of first order ODEs

Week 8-9 - Laplace transforms

Week 10-12 - Nonlinear systems of first order ODEs

Policies and resources to support student success

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty

and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available **here (http://senate.ubc.ca/policies-resources-support-student-success)** .