

MATH 1005 C Fall 2021

Differential Equations and Infinite Series for Engineering or Physics

Instructor: Dr. Mohammad-Reza Sadeghi

Email: msadeghi@math.carleton.ca

Prerequisite: i) MATH 1004; and ii) MATH 1104 (or MATH 1107), either previously or concurrently; or equivalents; or permission of the School. Restricted to students in the Faculty of Engineering, or in certain B.Sc. programs where specified.

Textbook: Ordinary Differential Equations and Infinite Series, 2nd edition by Sam Melkonian. Hard copies available at the Carleton University Bookstore. ebook available from Nelson Education Ltd.

Lectures: There are **no scheduled lectures**. Instead, every week 2 **Prerecorded** podcasts will be posted on **Brightspace** before Wed and Fri at about 16:05 pm. There will be **live session** every week on Wed 10:30 am to review the key points of topics and answer your questions. Attending to this session is **NOT** mandatory.

Podcasts start on Wed. Sep 8, and **classes end** at Fri. Dec 10.

Office Hours: There will be no formal office hours, so email is best.

- Any questions regarding tutorial or homework should be emailed to your TA.
- Any questions related to course operation should be emailed to the Professor.
- The email subject **MUST** begin with MATH1005C in order that it arrive to the correct mailbox.
- TA email addresses will be posted on [Brightspace](#).

Copyright: All course related materials (including slides, lecture notes, lecture videos, assignments, solutions, and tests) are intended for personal use only and **MAY NOT** be reproduced or redistributed without prior written consent of the author(s).

Private Tutor: tutorMath1004@gmail.com (contact directly)

Tutorials: Wed. 17:35-18:25 starting TBA, via BigBlueButton/Zoom.

There will be 1 hour tutorial each week. Tutorials will be devoted to problem solving.

Tutorial groups: Will be announced on Brightspace

		Student's Last name	Ta's email	Time
C1	In-person	Mohammad Dehghan	MOHAMMADDEHGHAN3@cmail.carleton.ca	Wed 17:35 - 18:25
C2	online	Yani Zhang	yanizhang@cmail.carleton.ca	Wed 17:35 - 18:25

Evaluation:

	Tutorial attendance: expected but not graded
40%	2 tests: 20%+20%
30%	3 assignments 3 x 10 = 30%
30%	Final exam,

Term Tests:

- **There will be two online tests on:**
Fri Oct 15, Fri Nov 26
- **Tests will be open for 24 hours beginning at 8 AM. You may choose the 100-minutes period within this time frame for when you write them.**
- **The material covered on each test will be announced one week before the test.**

There will be NO make-up tests.

Assignments due dates:

Oct. 2, Oct. 31 and Dec. 4

Late submissions may be subject to penalty, at the discretion of the instructor. While unforeseen circumstances may arise, once solutions to the assignment are posted, no further amendments will be considered.

Assignments must be submitted electronically in pdf format (please familiarize yourself with scanning apps, such as CamScanner). Late submissions may be subject to penalty, at the discretion of the Professor. While unforeseen circumstances may arise, once solutions to the assignment are posted, no further amendments will be considered. Please note all submission details as they are announced.

Any concern about Assignment's grading as well as midterm tests should brought to TAs first.

Final Examination:

There will be a 3-hour exam scheduled during the usual exam period in a 24 hours period. It is the responsibility of each student to be available at the time of the final examination. The final exam will be an online, e-proctored, three-hour closed book exam to be held during the period of (TBA) of Dec. The **Examination office is in charge of scheduling the dates and exams.** You should also check your email from your course instructor about instruction of the final exam.

E-mail: According to Carleton University policy under the Freedom of Information of Privacy Act (FIPPA), Please use your Carleton account ONLY for all course related email, and write your course code MATH1005C on the subject line.

Announcements:

You are responsible for keeping up with information announced or sent to your connect email account.

- **Violations** of Carleton's Integrity Policy will be dealt with in a formal fashion. All suspected incidents will be forwarded to The Office of The Dean of Science. Students are expected to be familiar the Academic Integrity Policy.
- **Plagiarism** is a specific matter of Academic Integrity. Plagiarism includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. In mathematics, an answer can not be plagiarized, but the presentation of its solution can! Thus, copying answers from fellow students, online posts, or online calculators (such as Wolfram, Symbolab, etc.) is strictly prohibited.

Topics

I Ordinary Differential Equations

1. Introduction
 - 1.1 Basic concepts
2. **First-Order Equations**
 - 2.1 **Separable Equations**
 - 2.1.1 **Orthogonal Trajectories**
 - 2.2 Homogeneous equations
 - 2.3 Linear equations
 - 2.3.1 **Bernoulli equations**
 - 2.4 **Functions of Two Variables**
 - 2.4.1 **Partial derivatives**
 - 2.4.2 **The Chain Rule**
 - 2.5 Exact equations
 - 2.5.1 **Integrating Factors**
3. Second-Order Equations
 - 3.1 Basic Definitions
 - 3.2 Linear Homogeneous Equations
 - 3.2.1 **Equations with Constant Coefficients**
 - 3.2.2 **Cauchy-Euler Equations**
 - 3.3 Linear Nonhomogeneous Equations
 - 3.3.1 The Method of Undetermined Coefficients 1
 - 3.3.1 **The Method of Undetermined Coefficients 2**
 - 3.3.2 **Variation of Parameters**
5. Linear Systems (2×2 systems only)
 - 5.1 Homogeneous Systems
 - 5.1.1 General Theory
 - 5.1.2 **Systems with Constant Coefficients, Complex Eigenvalues, Generalized Eigenvectors**

II Infinite Series

6. Sequences and Series
 - 6.1 Sequences 1
 - 6.1 **Sequences 2**

6.2 Series

6.2.1 The Integral Test, Approximations of Series

6.2.2 The Comparison Tests

6.2.3 Alternating Series, Approximations of Alternating Series

6.2.4 Absolute and Conditional Convergence Ratio and Root tests

7. Taylor Series

7.1 Power Series

7.2 Representations of Functions by Power Series,

7.2 The Binomial Series, Taylor Polynomials and Approximations

8. Fourier Series

8.1 Fourier Series of Periodic Functions

8.2 Fourier Series of Functions on Finite Intervals

Students with disabilities: Students with disabilities requiring academic accommodations in this course are encouraged to contact the Paul Menton Center for Students with Disabilities (500 University Center) to complete the necessary forms. After registering with the Center, make an appointment to meet with me in order to discuss your needs at least two weeks before the first in-class test or CUTV midterm exam. This will allow for sufficient time to process your request. Please note the following deadlines for submitting completed forms to the PMC for formally scheduled exam accommodations: TBA for fall and fall/winter term courses, and TBA for winter term courses."