

Math 4051 Theory of Ordinary Differential Equations

Course outline - Spring, 2023-2024

Course Home Page

<https://canvas.ust.hk/>

Instructor

Dr. Jishan HU

Lecture: Mo 16:30 – 17:50; Fr 12:00 - 13:20 Room 2404

Contact Details: room 3447; phone: 2358-7434; e-mail: majhu@ust.hk

Office Hour: MoWe 12:00 – 13:00

Teaching Assistant

CHEONG, Kha Man

Tutorial: Mo 18:00 – 18:50 Room 2407

e-mail: kmcheong@connect.ust.hk

Office Hour: Th 11:00 – 12:00

Math Support Center, Room 3011-3013 (Lift 3 or Lift 2)

Course Description

Duration: one semester. Credits: 3 units.

This course provides an exposition of basic theories and methodologies in ordinary differential equations. It will cover existence theorems, uniqueness theorems, continuation of solutions, stability and the Liapunov direct method.

Exclusions: None.

Prerequisite(s): (MATH 2350 OR MATH 2351 OR MATH 2352) AND (MATH 3033 OR MATH 3043)

Assessment Scheme

Based on one midterm examination, one final examination, and the homework assignments.

Homework: 10%; Midterm Exam: 45%; Final Exam: 45%.

Midterm:

12:00 – 13:20 Mar 15 (Friday) Venue: Room 2404

Student Learning Resources

Textbooks:

Garrett Birkhoff and Gian-Carlo Rota, Ordinary Differential Equations, John Wiley.

Some other supplemental materials will be provided by the instructor.

Teaching Approach

Lectures: The instructor will focus on illustrating the concepts of the course content.

Tutorials: We will focus on examples and problem solving skills.

Intended Learning Outcomes

Upon successful completion of this course, students should be able:

1. to understand the basic theorems of ODEs on existence, uniqueness and stability;
2. to have solid foundation for future study in pure mathematics, applied mathematics, and other physical sciences.

Course Schedule

Week	Content	Remarks
1	Some basics	
2	Uniqueness	
3	Continuity	
4	Existence theorem	
5	The Peano theorem	
6	Continuation of solutions	
7	Plane autonomous systems	
8	Linear autonomous systems	
9	Classification for linear systems	
10	Liapounov Direct Method	
11	Test for instability	
12	Nonlinear oscillations	