

MATH2351 Introduction to Differential Equations

Course Outline - Fall 2018-19

MATH2351 L1: Tuesday & Thursday 15:00-16:20, room 1103

Course Home Page

1) <https://machiang.wixsite.com/machiang>, 2) <http://www.math.ust.hk/people/faculty/profile/machiang/>

Instructor

Prof. Edmund Chiang

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Office Hours: My MSC (Rm 3011-13) **hours TBA**,
or by appointment

TA and Tutorials

Mr. Yi-Su, Lo

Office: Rm 3215

Email: yloab@ust.hk

T1A: Mon 14:00-14:50, Rm 2407

T1B: Tue. 10:30-11:20 Rm 6602

Course Description

First order equations and applications, second order equations, Laplace transform method, series solutions, system of linear equations, nonlinear equations and linear stability analysis, introduction to partial differentiation and partial differential equations, separation of variables, and Fourier series.

Duration: One semester

Credits: 3 units

Prerequisites: A passing grade in AL Pure Mathematics / AL Applied Mathematics;
OR MATH 1014 OR MATH 1018 (prior to 2013-14) OR MATH 1020
OR MATH 1024

Exclusion: MATH 2350, MATH 2352, PHYS 2124

Intended Learning Outcomes

On successful completion of this course, students are expected to be able to:

- Modeling and solving problems involving first order ODEs
- Solve linear second order ODEs
- Apply Laplace transform and its applications to solve certain ODEs
- System of linear first order ODEs
- Separable PDEs and Fourier series

Assessment Scheme

<u>Assessment</u>	<u>Assessing Course ILOs</u>
Homework (WeBWork) 12%	1, 2, 3
Tutorial 8%	1, 2, 3
Midterm Exam 30%	1, 2, 3
Final Exam 50%	1, 2, 3

- Homework sets will be delivered and submitted online via the WeBWork system. Students are allowed to submit and check answers through the WeBWork system as many times as preferred before the due time.
- Students should visit the following WeBWork@UST page to get familiar with the system as early as possible: <https://webwork.math.ust.hk/>
- The midterm examination is scheduled on 23rd October 2018. (and venue TBA.)

Learning Resources

Textbook: Boyce and Diprima *Elementary Differential Equations and Boundary Value Problems*, 10th (or similar) edition. Brooks/Cole.

Teaching and Learning Activities

- Lectures and Tutorials.
- Students may visit the **Math Support Center** at Room 3011-3013 (lifts 2-3) for help. [https://www.math.ust.hk/ support/](https://www.math.ust.hk/support/)

Tentative course schedule

Week	Topics
1	Introduction (1.1-1.2), Integration factors, Separation of variables (2.1, 2.2)
2	Modeling (2.3), Autonomous Eqn (2.5), Exact Eqn (2.6)
3	Euler's method (2.7), Existence/Uniqueness (2.8), 2nd order homogeneous ODEs (3.1-3.3),
4	Complex roots (3.4), non-homogeneous Eqn. (3.5), variation of parameters (3.6),
5	Applications (3.7-3.8) Eqn with ordinary point, Power series solutions (5.1-5.2)
6	ODEs with Regular singularities, Euler's Eqn (5.4), Power series solutions (5.5-5.6)
7	Laplace transforms and applications (6.1-6.2) , step functions (6.3)
8	Systems of ODEs (7.3), Homogeneous systems (7.4-7.5) Midterm Exam: 23rd October (venue TBA)
9	Complex eigenvalues (7.6), Repeated eigenvalues (7.8), Nonhomogeneous systems (7.9)
10	Boundary value problems (10.1), Fourier series (10.2-10.4)
11	Fourier series (10.2-10.4), Separation of variables (10.5), Heat Eqn (10.5)
12	Other heat conduction Eqns (10.6), Wave Eqn (10.7)
12	Wave Eqn (10.7), Laplace Eqn (10.8)
13	Sturm-Liouville theory (11.1), Revision