MATH4052 Partial Differential Equations

Course Outline- Fall 2023

1. Instructor

Prof. Yang XIANG, Email maxiang@ust.hk, Office 3425

Office Hour: Tuesday 15:00-16:00 (or by appointment)

2. Teaching Assistant

Miss. Chuqi CHEN, Email: cchenck@connect.ust.hk

3. Meeting Time and Venue

Lectures:L1

Date/Time: Tuesday and Thursday 09:00AM - 10:20AM

Venue: Room 4502

Tutorials:T1A

Date/Time: Wednesday 01:30PM - 02:20PM

Venue: Room 2304

4. Course Description

Credit Points: 3

Pre-requisite: MATH 2011/MATH 2023/MATH 3043
and MATH 2111/MATH 2121/MATH 2131/MATH 2350
and MATH 2350/MATH 2351/MATH 2352

Exclusion: NIL

Brief Information/synopsis:

Derivations of the Laplace equations, the wave equations and diffusion equation; Methods to solve equations: separation of variables, Fourier series and integrals and characteristics; maximum principles, Green's functions.

5. Intended Learning Outcomes

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

No.	ILOs
1	Learn types of partial differential equations, and techniques to solve elementary partial differential equations.
2	Formulate application problems in terms partial differential equations.
3	Find particular solutions to well-posed problems.
4	Exchange information with fellow students.
5	Enforce self-learning through filling gaps of derivations and proofs.

6. Assessment Scheme

a. Examination duration: 2.5 hours

b. Percentage of coursework, examination, etc.:

Assessment	Assessing Course ILOs
35% by homework	1, 2, 3, 4, 5
65% by final exam	1, 2, 3, 5

7. Student Learning Resources

Textbooks:

1. Partial Differential Equations: An Introduction, Walter A. Strauss, 2nd edition, JohnWiley & Sons, Hoboken, 2008.

8. Teaching and Learning Activities

Scheduled activities: 3 hours lecture, 1 hour tutorial

9. Course Topics (subject to minor changes)

(1) Introduction & first-order equations
(2) Waves and diffusions
(3) Well-posed problems and types of PDEs
(4) Boundary problems
(5) Fourier Series
(6) Laplace equations and harmonic functions
(7) Green's identities and Green's function method
(8) Waves in space
(9) Distributions and Fourier transform