The Hong Kong University of Science and Technology

UG Course Syllabus Fall 2026

Partial Differential Equations

MATH 4052

3 Credits

Pre-requisite: (MATH 2011 OR MATH 2023 OR MATH 2024) AND (MATH 2111 OR MATH 2121 OR MATH 2131 OR MATH 2350) AND (MATH 2350 OR MATH 2351 OR MATH 2352)

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Office Hours: Tuesday 15:00-16:00 Rm3445 (or by appointment)

Course Description

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.

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

Intended Learning Outcomes (ILOs)

By the end 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.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework	35%	To be announced on the Canvas course website
Final examination (2.5 hours written exam)	65%	To be announced by the university

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Homework	1, 2, 3, 4, 5	Provide students with exercises for them to have deeper understandings of the lecture contents.
Final Exam	1,2,3,5	Comprehensive assessment

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

You are warned against solely relying on AI to solve problems without truly grasping the underlying concepts.

Required Texts and Materials

Textbooks:

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

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.