Mathematics (MATH) 476

Partial Differential Equations (Revision 2)

Status:	Replaced with new revision, see the **course listing** for the current revision
Delivery mode:	**Individualized study online** with **eText**
Credits:	3
Area of study:	Science
Prerequisites:	**MATH 270**, **MATH 365**, **MATH 366**, and **MATH 376**, from Athabasca University; or equivalent courses from another institution. Professor approval is required to register in this course.
Precluded:	None
Challenge:	MATH 476 is not available for challenge.
Faculty:	**Faculty of Science and Technology**

Overview

Mathematics 476: Partial Differential Equations considers significant topics in this area of mathematics (see unit list below).

Outline

Mathematics 476 consists of the four units listed below:

- Unit 1: The Diffusion / Heat Equation in One Dimension
- Unit 2: The Wave Equation in One Dimension
- Unit 3: Higher-dimensional Partial Differential Equations
- Unit 4: Fourier and Laplace Transform Solutions of Partial Differential Equations

Learning outcomes

Upon successful completion of this course, you should be able to

- demonstrate understanding of the meaning of a partial differential equation (PDE), its order and solution; the concepts of initial and boundary conditions; and initial boundary value problems (IBVP).
- use physical laws such as the Fourier's law of heat conduction, Fick's law of diffusion, Newton's law on a vibrating string, and the conservation of thermal energy to derive the heat/diffusion, wave, and Laplace equations, respectively.
- solve initial boundary value problems for the heat/diffusion, wave, and Laplace equations subject to different boundary conditions, using Fourier series and separation of variables.
- use the method of characteristics to solve the initial value problem for the wave, equation on an infinite one-dimensional string, a semi-infinite string, and a vibrating string of fixed length.
- demonstrate understanding of the main properties of the Sturm-Liouville eigenvalue problem and of the concept of fundamental solution.

- describe how the properties of the Fourier, Fourier sine, Fourier cosine, and Laplace transforms are used to solve some partial differential equations.

Evaluation

To **receive credit** for *Mathematics 476*, you must achieve a minimum grade of D (50 percent) on the final examination and an overall grade of **D (50 percent)** for the entire course. The weighting of the composite grade is as follows:

Activity	**Weight**
Assignment 1	7.5%
Assignment 2	7.5%
Assignment 3	7.5%
Assignment 4	7.5%
Final Exam	70%
Total	**100%**

To learn more about assignments and examinations, please refer to Athabasca University's **online Calendar** .

Materials

Haberman, R. (2013). *Applied partial differential equations with Fourier series and boundary value problems* (5th ed.). Pearson Education. (eText)

eText

Registration in this course includes an electronic textbook. For more information on **electronic textbooks** , please refer to our **eText Initiative site** .

Other Materials

Mathematics 476 also includes an online course orientation and study guide.

Important links

- **Academic advising**
- **Program planning**
- **Request assistance**
- **Support services**

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View **previous revision**