



Nanchang University MATH402: Introduction to Partial Differential Equation

Professor: To be announced

Credit: 4

Contact Hours

This course is composed of 24 lecture sessions, 3 tutorial sessions and 9 office hours. Each lecture session takes 2 contact hours in length; each tutorial session takes 3 contact hours in length; There will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours)at the end of this term. This course has 72 contact hours in total.

Course Description

This course serves as an introduction to the study of partial differential equation, which has many extraordinary applications in science. We will start with the study of heat equation as an easy first order example, and study the separation of variables using different techniques in one and higher dimensions. After introducing and applying Fourier Series and Fourier Transform to PDE, we will conclude our course with Laplace Transformation. If time allows, method of characteristics will also be introduced but will not be tested on.

Note: Be prepared to purchase protective goggles and bring your lab manual.

Required Textbook

W. Strauss, Introduction to Partial Differential Equations, 2nd edition, John Wiley & Sons, (2008).
R. Haberman, Applied Partial Differential Equations, with Fourier Series and Boundary Value Problems,4th edition, Pearson Education, (2004).

Grading

- Participation 10%
- Quizzes 30%
- Midterm 20%
- Final Exam 40%

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|-----------|---------|----------|
| A+ 96-100 | A 90-95 | A- 85-89 |
| B+ 82-84 | B 78-81 | B- 75-77 |
| C+ 71-74 | C 66-70 | C- 62-65 |
| D 60-61 | F < 60 | |



Course Schedule

The course has 24 class sessions in total. All sessions are 2 contact hours in length. At the end of this term, there will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours).

Note: the course outline and required readings are subject to change.

Class 1:

Heat Equation with Boundary Conditions

Class 2:

Equilibrium Temperature Distribution

Class 3:

Separation of Variables: Linearity

Class 4:

Orthogonality of Sine and Cosine

Class 5:

Laplace's Equation

Class 6:

Fourier Series

Class 7:

Convergence Theorem

Class 8:

Differentiation and Integration of Fourier Series

Class 9:

Complex Form of Fourier Series

Class 10:

Wave Equation

Class 11:

Vibrating String

Class 12:

Vibrating Membrane

Class 13:



Midterm

Class 14:
Separation of the Time Variable

Class 15:
Raleigh Quotient and Laplace's Equation

Class 16:
Green's Formula

Class 17:
Nonhomogeneous Problems

Class 18:
Forced Vibrating Membranes

Class 19:
Fourier Transform Solutions

Class 20:
Fourier Transform and the Heat Equation

Class 21:
Laplace Transform

Class 22:
Properties of Laplace Transform

Class 23:
Inversion of Laplace Transform

Class 24:
Review for final

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.



Policy on “Late Withdrawals”

In accordance with university policy, appeals for late withdrawal will be approved **ONLY** in case of medical emergency and similar crises.

Academic Honesty

Nanchang University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:

- Attend all classes and be responsible for all materials covered in class and otherwise assigned;
- Complete the day's required reading and assignments before class;
- Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
- Participate in class discussions and complete required written work on time;
- Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;
- While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.