No:E831230   **Engineering Mathematics   III   Fall 2021**

Instructor:蕭士俊

Office: 水利系館 4684 室 Tel:2757575ext63262 Email: schsiao@mail.ncku.edu.tw

Class: Three 50 minutes lecture per week, Thur: 14:10-17:00 (水利系館 4625 室)

Objective: This course provides an introduction to the basic properties of multi-dimensional partial differential equations and to the techniques that have proved useful in analyzing them. Emphases are given to topics of three types of equations including Wave equation, Heat equation, and Laplace equation. Laplace transform and Fourier transform will also be introduced.

Text Book: (Required)

1. Kreyszig, E., *Advanced Engineering Mathematics,* 10th edition, John Wiley & Sons, 2011

Reference Book:

2. Strauss, W. A., *Partial Differential Equations: An Introduction,* John Wiley & Sons, 1992 (數學系)

Grading:

   Quizzes: 20%   Homework: 10%   Mid-term: 30%   Final: 40%

Course Outline

- **Review of Fourier Analysis and Separation of Variables**
    - **Fourier Series,**
    - **Half-Range Expansions**
    - **Separation of Variables**
- **Fourier Integral and Fourier Transform**
    - **Fourier Integral**
    - **Fourier Transform**
- **Wave Equation**
    - **Two-dimensional Wave Equation**
- **Heat Equation**
    - **Solution by Fourier Series**
    - **Solution by Fourier Integrals and Transforms**
- **Laplace Equation and Poisson's Equation**
    - **Laplace's Equation in Cylindrical Coordinates and Bessel's Equation**
    - **Poisson's Formula**
- **Series Solution of ODEs. Special Function**
    - **Power Series Method, Frobenius Method**
    - **Bessel's Equation and its Solutions**
- **Laplace Transform and Initial Value Problem**
    - **The Laplace Transform**
    - **Derivatives and the Convolution Theorem**