Advanced Engineering Mathematics I & II

- **Grading policy:** Exam 50% × 2 = 100%
- **Textbook:** Advanced Engineering Mathematics 7ed, O'Neil
- **Contents:**

Advanced Engineering Mathematics I

1. First Order Differential Equation

Separable Equations
Linear Differential Equation
Exact Differential Equation
Homogeneous, Bernoulli and Riccati Equation
Additional Application of Electrical Circuits
Existence and Uniqueness for Solution of Initial Value Problem

2. Second Order Differential Equation

The linear second-order Equation
The Constant Coefficient Homogeneous Linear DE
The Nonhomogeneous Equation
Spring Motion
Euler' Differential Equation

3. The Laplace Transform

Definition and Notation
Solution of IVPs Using the Laplace Transform
Shifting Theorems and the Heaviside Function
Convolution
Impulses and the Delta function
Laplace Transform Solution of Systems
Polynomial Coefficients

4. Series Solution

Power Series Solution of IVP
Power Series Solution Using Recurrence Relations

5. Fourier Series

The Fourier Series of a Function
Fourier Sine and Cosine Series
Integration and Differentiation of Fourier Series
Phase Angle Form of a Fourier Series
Complex Fourier Series

Advanced Engineering Mathematics II (Ch10 is not included)

6. The Fourier Integral and Fourier Transform

The Fourier Integral
Fourier Cosine and Sine Integral
The Complex Fourier Integral and the Fourier Transform
Additional Properties and Applications of the Fourier Transform
Fourier Cosine and Sine Transform

7. Special Functions and Orthogonal Expressions

Legendre Polynomials
Bessel Functions
Sturm-Liouville Theory and Eigenfunction Expansions

8. The Wave Equations

Derivation of the Wave Equation
Fourier Series Solution of the Wave Equation
Wave Motion Along Infinite and Semi-infinite String
Characteristics and d'Alembert's Solution

9. The Heat equation

Heat equation and boundary condition
Fourier Series Solutions of the Heat Equation
Heat Conduction in an Infinite Media

10. The Potential Equation

Laplace's Equation
Harmonic Functions and the Dirichlet Problem for a Rectangle