
Course Title : Engineering Mathematics

- **Aim:**

The main goal of this course is to familiar students with some basic concepts of mathematics and their applications in the chemical engineering. In this course, Fourier series, transforms and integrals as well as some special functions such as Bessel and Legendre and their applications in solving of differential equations are covered, as are topics from complex numbers and functions

- **Syllabus:**

- ✓ A review on ordinary differential equations: Classification of differential equations A review on analytical solutions
- ✓ Special function (1): Gamma function Beta function Error function
- ✓ Special function (2): Bessel differential equations Bessel functions Modified Bessel functions Legendre differential equation Legendre function
- ✓ Orthogonally: Orthogonally of functions Sturm-Liouville problems Application of orthogonal functions
- ✓ Fourier series (1): Basic concepts Trigonometric Fourier series Derivative and integration of Fourier series
- ✓ Fourier series (2): Fourier cosine and sine series Complex Fourier series Multiple Fourier series
- ✓ Fourier integrals: Fourier integrals Fourier cosine and sine integrals
- ✓ Fourier integral transforms: Fourier transform Fourier cosine and sine transforms Properties of Fourier transform
- ✓ Laplace integral transforms: Laplace transform Properties of Laplace transform
- ✓ Partial differential equations (PDE) (1): Heat equation Separation of variables methods Fourier transform for heat equation
- ✓ Partial differential equations (PDE) (2): Non-uniform heat equation 2D heat equation Laplace equation in cylindrical and spherical coordinates
- ✓ Partial differential equations (PDE) (3): Vibrating string, Wave equation Solution by separating variables methods Non-uniform wave equation 2D wave equation
- ✓ Partial differential equations (PDE) (4): Self-similarity theorem Combination of variables
- ✓ Complex numbers and functions (1): Complex numbers Polar forms of complex numbers Derivative of analytical functions
- ✓ Complex numbers and functions (1): Cauchy-Riemann integral Taylor theorem Residue theorem

- **Reading Resources:**

Advanced Engineering Mathematics by Erwin Kreyszig