

BA323- Mathematics (5)

Hour: Lecture: 2 Hrs.

Tutorial: 2 Hrs.

Credit: 3.

Coordinator: Abdelrheem Abdelhameed

Text Book:

- Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th edition , 2006 .

Specific course information:

- a. In the first of this course we discuss the solution of ordinary differential equations with variable coefficients using Taylor's, power series and Frobenius methods, then we go into some special differential equations, as Legendre and Bessel differential equations which lead us to some special functions, as Legendre, Bessel, Gamma and Beta functions. After that we study the method of separation of variables to solve partial differential equations that help us to study some applications like heat transfer in a bar, vibrating of a string and potential fields. In the last of this course we discuss some special complex transformations, conformal mappings, such as bilinear and Schwarz Christoffel transformations.
- b. Prerequisite: BA224
- c. Designation: Required

Specific goals for the course:

- An ability to apply knowledge of mathematics, science, and engineering.

Course instruction outcomes:

- The students will be able to Solve ordinary differential equations with variable coefficients.
- The students will be able to Solve partial differential equations with the method of separation of variables.
- The students will be able to Deal with some special functions.
- The students will be able to Construct some special complex functions

Student outcomes:

A, E

Topics Covered:

Taylor's and Power series methods for solving ordinary differential equations - Differential equation with variable coefficients, ordinary and singular points, solution about ordinary points - Solution about singular points: Regular singular points, the method of Frobenius, Case I. - The method of Frobenius , Case II and Case III. - Gamma and Beta functions - Legendre differential equation and Legendre polynomials - Bessel differential equation. -

Bessel function of the 1st kind - Boundary value problems, partial differential equations and the method of separation of variables- Heat equation, heat transfer in a bar - Wave equation, vibration of a string - Laplace equation and potential fields - Conformal mappings, Complex functions as mappings - Bilinear transformations, linear fraction transformation - Schwarz Christoffel transformation

Course / credit hours	Math & Basic Sciences	Engineering Topics	General Education
Math 4 (BA323)/3	3		