Module title: Engineering Mathematics

Module code: 24-14-203-01

Module credit: 3

Module objectives

This course is intended for undergraduate students in Mechanical Engineering. The overall goal of the course is to provide the students with sufficient exposure to advanced mathematical methods and tools that are relevant to theoretical and mathematical aspects of mechanical engineering research.

Term: First Term

Lecturer: Dr. Faramarz Sarhaddi

Associate Professor

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Assessments:

30% mid-term exam

60% final exam

10% quiz and home works

Reference:

Advanced Engineering Mathematics (10th Edition), Erwin Kreyszig ISBN-13: 978-0470458365; ISBN-10: 9780470458365

Module subjects:

1st. week: Introduction, Fourier series

2nd. week: Fourier integral, Fourier transforms

3rd. week: Elementary concepts on partial differential equations (PDEs), the characteristics method for the solution of first order partial differential equations

4th. week: The separation of variables method for the solution of first order partial differential equations

5th. week: The separation of variables method for the solution of second order homogeneous partial differential equations

6th. week: D'Alembert's method for the solution of second order homogeneous partial differential equations

7th. week: The separation of variables method for the solution of second order nonhomogeneous partial differential equations in cartesian coordinate

Mid-term Exam

8th. week: The separation of variables method for the solution of second order nonhomogeneous partial differential equations in cylindrical coordinate

9th. week: Complex numbers and functions

10th. week: Limit, continuity and derivative of complex functions

11th. week: Analytic functions and Cauchy-Riemann equations, harmonic functions

12th. week: Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, derivatives of an analytic function

13th. week: Power series, Taylor and Maclaurin series

14th. week: Laurent series, singularities and zeros, poles, residue integration method

15th. week: Conformal mapping, linear fractional transformations

16th. week: Complex analysis and potential theory

Final Term Exam