German Jordanian University

School of Basic Sciences and Humanities

Differential Equations (MATH205)

Class Times and Location

Textbook

- Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition, Wiley.

Other References

- Elementary Differential Equations, W. Boyce and R. DiPrima, 10th Edition. Wiley, 2013
- Mathematical Methods in the Physical Sciences, Mary L. Boas. Third Edition. Wiley, 2006.
- Introduction to Mathematical Physics, Nabil Laham & Nabil Ayoub

Course Objective

To provide the student with the fundamental elements and techniques of solving differential equations, which are instrumental in all fields of science and engineering.

Course Grading Policy

First Exam	30%
Second Exam	30%
Final Exam	40%
Course Total Grade	100%

Cheating or Plagiarism

Cheating is not tolerated and will be dealt with harshly. Any form of cheating will result into immediate failing of the class in accordance with University Regulations.

Classroom Conducts and Attendance:

This will be discussed thoroughly during the first day of classes.

IMPORTANT NOTE: *Absences may be* ***excused*** *by medical certificate but they are* ***never erased****. The only circumstance where an absence is erased is if a student is officially representing the university and has produced a letter from Student Affairs to prove this or if a student must attend an exam on the* ***same day and time*** *provided an acceptable letter is produced from the relevant Doctor of that subject. All other absences are considered as official and are counted. A verbal warning will be given by the teacher after 3 absences. A written formal warning will be given after 4 absences and a student with 5 absences will be required to drop the course and re-register the following semester.* ***If a student is regularly late this will result in an absence****.*

The following are the instructions given in the university regulations: ***A student is not permitted to absent himself / herself from more than 15% of the total number of credit hours assigned for each course (i.e. four lectures of the total number of lectures prescribed for a course that is being taught two times per week with a duration of one hour and a half per lecture).***

Week	Chapter	Homework
1,2,3	Chapter 1: First-Order Ordinary Differential Equations	
	1.1 Basic Concepts. Modeling	9-19
	1.3 Separable ODEs. Modeling	2-17
	1.4 Exact ODEs. Integrating Factors	1-16
	1.5 Linear ODEs. Bernoulli Equation	1-13, 2 -28
4,5,6	Chapter 2: Second-Order ODEs	
	2.1 Homogeneous Linear ODEs of Second Order	3-10
	2.2 Homogeneous Linear ODEs with Constant Coefficients	1-30
	2.5 Euler–Cauchy Equations	2-6, 12 19
	2.7 Nonhomogeneous ODEs	1-18
	2.9 Modeling: Electric circuits	
7,8,9	Chapter 6: Laplace Transforms	
	6.1 Laplace Transform. Linearity. First Shifting Theorem	1-14, 25 - 45
	6.2 Transforms of Derivatives and Integrals. ODEs	1 – 21 (odd problems), 22
	6.3 Unit Step Function (Heaviside Function). Second Shifting Theorem (*t*-Shifting)	1-27
	6.4 Short Impulses. Dirac's Delta Function.	3-12
	6.5 Convolution	
	6.6 Differentiation and Integration of Transforms. ODEs with Variable Coefficients.	1 – 11, 14 - 20
	6.7 Systems of ODEs	2 – 13
10,11,12	Chapter 5: Series solutions of ODEs and Special functions.	
	5.1 Power Series Method	6 – 10
	5.2 Legendre's Equation. Legendre Polynomials	
	5.3 Extended Power Series Method: Frobenius Method	1 – 13
12, 13,	Chapter 11: Fourier Analysis	
	11.1 Fourier Series	1, 2, 6 – 10, 14 – 18,
	11.2 Arbitrary Period. Even and Odd Functions.	1, 2, 8 – 10, 23, 24
	11.5 Sturm–Liouville Problems. Orthogonal Functions	7 – 12
	11.9 Fourier Transform.	2, 7
14,15	Chapter 12: Partial Differential Equations (PDE)	
	12.1 Basic Concepts of PDEs	2 – 12 (odd Problems), 18, 19
	12.3 Solution by Separating Variables	5 – 10
	12.4 D'Alembert's Solution of the Wave Equation.	9-14
	12.6 Heat Equation: Solution by Fourier Series.	5-7