

Course Description Form

1. Course Name:	
Ordinary Differential Equations	
2. Course Code:	
MS 202	
3. Semester / Year:	
Second Semester/2024-2023	
4. Description Preparation Date:	
25-3-2024	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours/ 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Esraa Habeeb Khaleel Email: esraa.h.khaleel@tu.edu.iq	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none"> • To learn the basics of differential equations:.... • To learn the classification and types of differential equations. • Training the student on methods and strategies for solving differential equations. • Identify the applications of differential equations in different fields such as physics, chemistry and engineering sciences. • Understanding the basics concepts of differential equations. • Gaining the ability and skill to use methods of solving first order differential equations and dealing with them. • learning the linear homogeneous and non-homogeneous differential

	<p>equations with constant coefficients of n-th order.</p> <ul style="list-style-type: none"> learning the Linear differential equations with variable coefficient like Euler equation and the method of solving this equation.
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9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Basic concepts in differential equations	Definition of ordinary differential equations, order and degree of the equation	Lectures	Discussion and tests
2	4	Types of differential equations	Linear and nonlinear differential equations (classifications)	Lectures	Discussion and tests
3	4	First-order differential equations and methods for solving them	Solving the differential equation using the separation of variables method and the homogeneous method, solving the differential equation using the linear method, and solving the Bernoulli equation.	Lectures	Discussion and tests
4	4	Second-order differential equations and methods for solving them	Basic principles of homogeneous and inhomogeneous second-order differential equations, solving the homogeneous second-order differential equation, various examples.	Lectures	Discussion and tests
5	4	Second-order differential equations and methods for solving them	Solving the second-order non-homogeneous differential equation using the undetermined coefficient method. Solving the second-order non-homogeneous differential equation using the variation parameters method	Lectures	Discussion and tests
6	4	Differential equations of higher degrees and methods of solution	Homogeneous differential equations of higher degrees and finding the general solution to them. Inhomogeneous differential equations and finding the general solution to them.	Lectures	Discussion and tests

7	4	Laplace transform	Introduction to the Laplace transform and its properties, inverse Laplace transform	Lectures	Discussion and tests
8	4	Laplace transform	Solution methods, direct laws, inverse displacement method	Lectures	Discussion and tests
9	4	Laplace transform	Partial fraction method, convolution theory	Lectures	Discussion and tests
10	4	Laplace transform	Solving differential equations using the Laplace transform	Lectures	Discussion and tests
11	4	General Review	Review the types of differential equations and methods for solving them, along with solving a variety of examples	Lectures	Discussion and tests
12	4	General Review	Review the types of differential equations and methods for solving them, along with solving a variety of examples	Lectures	Discussion and tests
13	4	Solving differential equations with sequences	The general concept of sequences	Lectures	Discussion and tests
14	4	Solving differential equations with sequences	Study of power series and their convergence	Lectures	Discussion and tests
15	4	Solving differential equations with sequences	Using power series to solve the differential equation at the normal point and using it at the abnormal point using the Frobenius method and the Bessel equation	Lectures	Discussion and tests

