Differential Equations

COURSE CODE: MA: 230

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| **Lecture Schedule** | Monday & Wednesday 09:30-11:00 Monday & Wednesday 14:00-15:30  | **Semester** | Fall 2014 |
| **Credit Hours** | 03 | **Pre-requisite** | MA 111, Applied CalculusMA 100, Calculus I |
| **Instructors** | Mr. Naeem Saleem | **Contact** |  |
| **Teaching Assistant** | Miss Bibi Noor Khatama Jan | **Contact** |  |
| **Offices** | 3S-39 R# 6 | **Office Hours** | See office door or moodle. |
| **Course Description** | The aim of this introductory course is to familiarize students to the subject of differential equations and their applications in simple physical situations. The student is supposed to understand how DE’s arise in mathematics, physics and engineering and the importance of initial and boundary conditions in solving an equation. Standard methods for solving first order DE’s. In addition, student able to understand general method for solving second order DE’s with constant coefficients and its applications. Laplace and Fourier transform techniques will introduce in this course and applied in simple cases. The method of solution in series will discuss and exemplify.   |
| **Expected Outcomes** | * The student should be able to understand the basic concepts and terms of differential equations and their applications in simple physical situations.
* The student is supposed to understand how DE’s arise in mathematics, physics and engineering.
* The student should appreciate the importance of initial and boundary conditions in solving an equation
* The student should be able to classify a given DE and be able to analyze which method to apply.
* He should be familiar with Laplace and Fourier transform techniques.
* Modeling of Electrical Circuits
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| **Textbook:** | * D.G. Zill: *Differential Equations and their Applications,* Latest edition
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| **Reference:** | * Erwin Kreyzig, Advanced Engineering Mathematics, Latest edition.
* C.H. Edwards, David E. Penney, Elementary Differential Equations with applications, Latest edition.
* Michael Greenberg, Advanced Engineering Mathematics, Latest edition.
* Zill, Prindle Weber and Schmidt, A first Course in Differential Equations, Latest edition.
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| **Sessional exams**  | At least 4 Quizzes &4 assignments and one Mid Term | **Final exam** | Will cover the whole course  |
| **Attendance Policy** | Students missing more than 25% of the lectures will receive an “SA” grade in the course. |
| **Evaluation criterion** | * Assignments: 10 %
* Quizzes: 10%
* Mid-Term: 30%
* Exam final : 50%
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 **Course Outline**

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| **Wk** | **1st Lecture** | **2nd Lecture** |
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| 1 | Introduction to Ordinary Differential Equations | Solution of ODE’s |
| 2 | Geometric Considerations and Isoclines | Separable Equations |
| 3 | Equations Reducible to Separable form | Exact Differential Equations |
| 4 | Integrating Factors | Linear first order differential equations |
| 5 | Ordinary Linear DE | Homogeneous Linear DE of Second Order |
| 6 | Homogeneous Second Order Equations with constant Coefficients | Differential Operators |
| 7 | Cauchy Equations | Variation of Parameters |
| 8 | **Midterm exam** |  |
| 9 | Homogeneous Linear Equations of Arbitrary Order with constant coefficients | Non homogeneous Linear Equations |
| 10 | Non homogeneous Linear Equations (Cont.) | Non homogeneous Linear Equations (Cont.) |
| 11 | Modelling of Electrical Circuits | System of Differential Equations |
| 12 | System of differential equation (Cont.) | Series solution of DE |
| 13 | Partial DE | Method of Separation of Variables for PDE |
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| 14 | Fourier Series | Solution of DE using Fourier series method |
| 15 | Solution of Wave equation | Solution of Heat Equations, Solution of Laplace Equation  |