King Saud University
Department of Mathematics
Syllabus of MATH204, First semester 1437/1438H

Course code: MATH204
Course title: Differential Equations
Pre-Requisite: MATH203 or MATH200
Instructor: Dr. Saleem Obaidat
          Room 2A123, Building 4, Mathematics Department.
Text book: Differential equations with boundary value problems (7th or 6th edition),
By Dennis G. Zill and Michael R. Cullen
References: Differential Equations by S. Mesloub, M. Damlakhi and K. Z. Elahi.
Course objectives
    1- Provide basic concepts of ordinary differential equations.
    2- Provide methods for solving some types of ordinary differential equations.
    3- Introduce some applications of ordinary differential equations.

Course contents

# Week	Topics	Contact hours (Lectures+Tutorials)
1	Definition of a Diff Eq., Classification of Diff Eqs. by (type, order, linearity) , Interval of definition, Types of Solutions (explicit, implicit).	3+2
2	Initial value problems. Existence and uniqueness theorem, Separable equations.	3+2
3	Linear equations, Exact Equations, Integrating factor.	3+2
4	Solutions by substitution: Homogeneous equations.	3+2
5	Bernoulli's equation, First order differential equations with linear coefficients	2+2
6	Linear Models: Growth and decay, Newton's Law of Cooling/ Heating	3+2
7	Higher order Linear DEs: Existence-Uniqueness theorem, Linearly (independent, dependent), Wronskian of functions, Reduction of order	3+2
8	Homogeneous linear equations with constant coefficients.	3+2
9	Undetermined coefficient method, Superposition principle.	3+2
10	Variation of parameters, Cauchy-Euler Equation.	3+2
11	Solving systems of Linear Equations by Elimination.	3+2
12	Series solutions of Linear Equations.	3+2
13	Orthogonal Functions and Fourier Series.	3+2
14	Fourier cosine and sine series, Complex Fourier Series.	3+2
15	Fourier Integral.	3+2
16	Revision	

Homework assignments:

Chapter	Section	Exercices
1	1.1	1, 2, 3, 4, 7, 10, 13, 17, 25
2	2.1	2, 5, 8, 10, 17, 19
	2.2	2,5, 12, 14, 16, 19, 33, 40, 47, 50, 58, 59, 61
	2.3	11, 19, 20, 24, 25, 27, 33, 40
	2.4	5, 9, 17, 29, 31, 38
	2.5	4, 6, 11, 17, 28, 42, 49
	2.6	1, 3, 5, 10
3	3.1	11, 13, 20, 27
	3.2	1, 2, 3, 4, 5, 6, 7, 12, 13, 14
4	4.1	1, 5, 9, 15, 16, 17, 19, 20, 23, 27, 28, 30, 33, 37, 38, 39, 41, 42
	4.2	3, 6, 13, 19, 21, 31, 32, 33
	4.3	3, 5, 8, 21, 24, 25, 31, 33,37, 42, 57, 58, 60, 61, 63
	4.4	1, 5, 7, 10, 15, 17, 19, 21, 24, 29, 32,38
	4.7	1, 4, 9, 15, 17, 21
6	6.1	5, 13, 18, 21, 26, 34, 36, 43
	6.3	3, 9, 10, 14, 15, 23
8	8.1	2, 3, 5, 10, 13, 20, 21, 23
11	11.1	1, 3, 6, 8, 9, 12, 16, 17, 18
	11.2	3, 5, 7, 17, 19
	11.3	11, 13, 19, 23, 32, 36
14	14.3	2, 3, 7, 9, 15, 19

Grading
First midterm 25%
Second midterm 25%
Homework Assignments and short Quizzes 10%
Final exam 40%
Total 100%
First mid-term exam: 7- 8:30 PM, Wednesday 2/2/1438 H.
Second mid-term exam: 7- 8:30 PM, Wednesday 29/3/1438 H**.**

Useful online Material
1. Paul's Online Math Notes Differential Equations
http://tutorial.math.lamar.edu/classes/de/de.aspx
2. SOS Differential Equations
http://www.sosmath.com/diffeq/diffeq.html
3. Wikipedia, the free encyclopaedia
        http://en.wikipedia.org/wiki/Ordinary_differential_equation
4. Lectures on Differential Equations (Video MIT)
http://ocw.mit.edu/OcwWeb/Mathematics/18-03Spring-2006/VideoLectures/index.htm
5.   http://eqworld.ipmnet.ru/index.htm