

King Fahd University of Petroleum and Minerals  
 Department of Mathematics & Statistics  
 Math 202 Syllabus (181)  
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Course Title:	Elements of Differential Equations
Credit:	3-0-3
Textbook:	A First Course in Differential Equations by D.G. Zill, 10th Ed.
Course Description:	First-order and first -degree differential equations. Linear Models. Homogeneous differential equations with constant coefficients. Undetermined coefficients -Annihilator Approach, reduction of order, variation of parameters, and Cauchy-Euler equation. Series solutions. Systems of linear first-order differential equations.

**Learning outcomes:**

Upon completion of the course, students should be able to:

1. Recognize basic definitions and terminology associated with differential equations and their solutions.
2. Describe the region in which a first-order initial-value problem has a unique solution.
3. Identify and solve first-order differential equations of various types.
4. Solve some real-life problems using linear models.
5. Recognize the basic theory of linear differential equations.
6. Apply the method of Reduction of Order to homogeneous linear second-order differential equations.
7. Find the general solution of homogeneous linear nth-order differential equations with real constant coefficients.
8. Use the method of Undetermined Coefficients to find a particular solution of a nonhomogeneous nth-order differential equation with real constant coefficients.
9. Use the method of Variation of Parameters to find a particular solution of a second-order linear nonhomogeneous differential equation.
10. Solve a Cauchy -Euler Equation.
11. Find Power Series and Series solutions of linear second-order differential equations about ordinary and regular singular points, respectively.
12. Solve systems of linear homogeneous and nonhomogeneous differential equations using eigenvalues and eigenvectors.
13. Solve systems of linear homogeneous and nonhomogeneous differential equations using Matrix Exponentials.

**Grading Policy:**

Exam I	Materials: 1.1-4.1.1 Date: Thursday, October 4, 2018	Place: BLD 57 Time: 6:00-8:00 PM	25% (100 points)
Exam II	Materials: 4.1.2-4.7 Date: Thursday, November 8, 2018	Place: BLD 57 Time: 6:00 -8:00 PM	25% (100 points)
Final Exam	Material: Comprehensive Date: Sunday, December 16, 2018	Place: TBA Time: 7:30AM-10:30	35% (140 points)

		AM	
Class Work	Based on quizzes, that should be of written type and not of multiple-choice type. The average $\bar{x}$ (out of 60) of class activities of the sections taught by the same instructor should be in the interval [42,45].		15% (60 points)

**Exam Questions:**

The questions of the common exams are based on the examples, homework problems and the exercises of the textbook.

**Missing one of the Two Common Major Exams-I or II:**

No makeup exam will be given under any circumstance. When a student misses Exam-I or Exam-II for a valid reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula which depends on his performance in the non-missing exam and in the final exam.

**Attendance:**

KFUPM attendance policy will be enforced. A DN grade will be awarded to any student who accumulates 9 unexcused absences.

**Academic Integrity:**

All KFUPM policies regarding ethics apply to this course.

**Passing Grade:**

Passing grade in the course is 50% of 400.

Wk#	Date	Sec.	Material	Homework
1	Sept. 2 – 6	1.1	Definitions and Terminology	1, 7, 9, 12, 14, 16, 19, 21, 23, 25, 27, 32, 35, 37
		1.2	Initial Value Problems	1, 3, 7, 9, 12, 17, 19, 22, 25, 30a
2	Sept. 9 – 13	2.2	Separable Variables	5, 6, 10, 12, 19, 21, 25, 29, 32, 46
		2.3	Linear Equations	4, 12, 14, 17, 24, 26, 28, 30, 36
3	Sept. 16 – 20	2.4	Exact Equations	1, 5, 8, 12, 26, 28, 30, 31, 34, 37, 42a, 43
		2.5	Solutions by Substitutions	1, 6, 8, 10, 12, 16, 22, 26, 28, 30
September 23, 2018: National Day Holiday				
4	Sept.24 – 27	2.5	Continuation	
		3.1	Linear Models: Growth & Decay, Newton's Law of Cooling	2, 4, 8, 10, 14, 16, 18a, 19
5	Sept.29–Oct.4	4.1.1	Initial and Boundary Value Problems	1, 4, 5, 10, 12, 13c, 14d
		4.1.2	Homogeneous Equations	15, 20, 23, 27, 28, 30
<b>Exam I: Thursday, October 4, 2018, Material: (1.1-4.1.1), (6:00-8:00pm), Location :BLD TBA</b>				
6	Oct. 7 – 11	4.1.3	Nonhomogeneous Equations	31, 34, 36a – 36d
		4.2	Reduction of Order	1, 3, 6, 10, 13, 16, 17, 20
7	Oct. 14 – 18	4.3	Homogeneous Linear Equations with Constant Coefficients	5, 8, 12, 14, 16, 22, 27, 34, 36, 38, 42, 50, 51
		4.5	Undetermined Coefficients--Annihilator Approach	2, 5, 8, 13, 15, 20, 25, 28, 30, 34, 41, 44, 48, 50, 61, 64, 68
8	Oct. 21–25	4.5	Continuation	
		4.6	Variation of Parameters	1, 5, 12, 18, 21, 23, 25, 27
<b>Exam II: Thursday, November 8, 2018, Material: (4.1.2 – 4.7), (6:00 -8:00 PM), Location: BLD TBA</b>				
9	Oct.28–Nov.1	4.7	Cauchy-Euler Equation (both methods)	1, 6, 8, 13, 16, 18, 20, 23, 25, 29, 32, 36, 38, 40, 42
		6.1	Review of Power Series	2, 3, 4, 8, 10, 12, 16
10	Nov. 4 – 8	6.2	Solutions about Ordinary Points	2, 4, 11, 12, 16, 21, 22
11	Nov. 11 – 15	6.3	Solutions about Singular Points	1, 4, 8, 12, 14, 15, 18, 24, 30, 32
		App II.1 App II. 2	Matrices and Linear Systems (review)	12, 16, 19, 23, 26, 30c, 30g, 36, 39, 44
12	Nov. 18 – 22	App II.3	Eigenvalue Problem	47, 49, 53, 54, 56, 59, 60, 61
		8.1	Preliminary Theory-Linear Systems	2, 7, 9, 14, 15, 16, 19, 22, 24, 25
13	Nov.25 – 29	8.2	Homogeneous Linear Systems	NA
		8.2.1	Distinct Real Eigenvalues	1, 2, 7, 9, 14
		8.2.2	Repeated Eigenvalues	20, 24, 26, 29, 30
14	Dec. 2 – 6	8.2.3	Complex Eigenvalues	34, 37, 42, 46
		8.3.2	Variation of Parameters	11, 14, 18, 28, 30, 32
15	Dec. 9 – 13	8.4	Matrix Exponential (No Laplace Trans.)	1, 5, 6, 8, 9, 10
			Review	
<b>Final Exam: Sunday, December 16, 2018, Time: 7:30 -10:30AM. Material: Comprehensive.</b>				