

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 202 – Syllabus

Semester 182

Coordinator: Dr. Khalid Alanezy

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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 Edition
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 n th-order differential equations with real constant coefficients.
8. Use the method of Undetermined Coefficients to find a particular solution of a nonhomogeneous n th-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	Material: 1.1 -- 3.1 Date: Thursday, February 7, 2019	Place: TBA Time: TBA	25% (100 points)
Exam II	Material: 4.1 -- 4.7 Date: Tuesday, March 12, 2019	Place: TBA Time: TBA	25% (100 points)
Final Exam	Material: Comprehensive Date: Sunday, April 21, 2019	Place: TBA Time: 8:00 - 11:00 AM	35% (140 points)
Class Work	Based on quizzes, class tests or other class activities determined by the instructor. Any quiz or test under class activities should be of written type and not of multiple-choice type. The average 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 an 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:

A student must score at least 50% (200 points out of 400) to pass the course.

Week#	Date	Section	Material	Homework
1	January 6 – 10	1.1	Definitions and Terminology	6, 9, 13, 14, 18, 20, 23, 29, 32, 36, 38
		1.2	Initial Value Problems	2, 5, 13, 19, 22, 24, 26, 30
2	January 13 – 17	2.2	Separable Variables	6, 10, 12, 21, 24, 26, 30, 32, 48
		2.3	Linear Equations	4, 12, 15, 18, 20, 22, 28, 30, 36
3	January 20 – 24	2.4	Exact Equations	4, 5, 8, 12, 15, 20, 24, 28, 30, 33, 34, 42, 43
		2.5	Solutions by Substitutions	2, 6, 8, 10, 12, 16, 22, 25, 28, 29
4	January 27 – 31	2.5	Continuation	
		3.1	Linear Models: Growth & Decay, Newton's Law of Cooling	4, 6, 7, 15, 17, 20
5	February 3 – 7	4.1.1	Initial and Boundary Value Problems	2, 4, 6, 10, 12, 13 (c), 14(d)
		4.1.2	Homogeneous Equations	16, 22, 24, 25, 28, 30
Exam I: Thursday, February 7, 2019, Material: [1.1 – 3.1]				
6	February 10 – 14	4.1.3	Nonhomogeneous Equations	31, 34, 36 (a, b, c)
		4.2	Reduction of Order	4, 6, 10, 13, 16, 18, 19
7	February 17 – 21	4.3	Homogeneous Linear Equations with Constant Coefficients	5, 8, 12, 14, 18, 22, 28, 32, 36, 42, 49, 50
		4.5	Undetermined Coefficients: Annihilator Approach	2, 8, 14, 20, 23, 25, 28, 32, 34, 44, 48, 50, 61, 64, 68, 71
8	February 24 – 28	4.5	Continuation	
		4.6	Variation of Parameters	2, 4, 6, 11, 12, 18, 22, 24, 26, 27, 28
9	March 3 – 7	4.7	Cauchy-Euler Equation (Both Methods)	1, 8, 9, 11, 16, 18, 22, 29, 32, 36, 38, 40
		6.1	Review of Power Series	2, 3, 4, 8, 10, 12, 16
10	March 10 – 14	6.2	Solutions about Ordinary Points	2, 4, 11, 12, 16, 20, 21, 22
Exam II: Tuesday, March 12, 2019, Material: [4.1 – 4.7]				
11	March 17 – 21	6.3	Solutions about Singular Points	1, 4, 8, 12, 14, 16, 19, 24, 30, 32
		App II.1 App II. 2	Matrices and Linear Systems (Review)	12, 18, 22, 23, 26, 30 (a, b, e), 36, 40, 44
12	March 24 – 28	App II.3	Eigenvalue Problem	48, 49, 53, 54, 56, 59, 60, 61
		8.1	Preliminary Theory-Linear Systems	2, 3, 6, 8, 10, 14, 15, 16, 19, 22, 24, 25, 26
13	March-April 31 – 4	8.2	Homogeneous Linear Systems	
		8.2.1	Distinct Real Eigenvalues	2, 6, 7, 9, 10, 14
		8.2.2	Repeated Eigenvalues	22, 24, 26, 27, 29, 30
14	April 7 – 11	8.2.3	Complex Eigenvalues	34, 37, 38, 42, 46
		8.3.2	Variation of Parameters	12, 14, 15, 28, 30, 31
15	April 14 – 18	8.4	Matrix Exponential (No Laplace Transform)	1, 3, 5, 7, 9, 10, 14
			Pace Adjustment + Review	
Final Exam: Sunday, April 21, 2019, Time: (8:00 - 11:00 AM), Material: Comprehensive				