

**King Fahd University of Petroleum and Minerals**  
**Department of Mathematics & Statistics**  
**Math 202 – Syllabus**  
**2017-2018 (172)**  
**Coordinator: Dr. Husain Al-Attas**  
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**Title:** Elements of Differential Equations.  
**Credit:** 3-0-3  
**Textbook:** A First Course in Differential Equations by D.G.Zill, 10<sup>th</sup> edition, 2017  
**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 for MATH 202

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:**

1. Exam I	Materials: 1.1--3.1	Place: Bldg. 57	25% (100 points)
	Date : Thursday February 22, 2018	Time: 6:00 PM	
2. Exam II	Materials: 4.1--4.7	Place: Bldg. 57	25% (100 points)
	Date : Thursday March 29, 2018	Time: 6:30 PM	
3. Final Exam	Material: Comprehensive	Place: TBA	35% (140points)
	Date: TBA	Time: TBA	
4. Class Work			15% (60 points)
	It is based on quizzes, class tests, or other class activities determined by the instructor. Any quiz or test under class activity 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 $[42, 45]$ .		

**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 TwoCommonMajorExams-I or II:**

No makeup exam will be given under any circumstance. When a student misses Exam-I or Exam-II for a legitimate 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:** A student must score at least 50% (200 points) to pass the course.

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Week#	Date	Text Sections	Topic	Suggested Review Exercises
1	January 21-25	1.1	Definitions and Terminology	5, 13, 14, 18, 20, 22, 29, 32, 36, 38
		1.2	Initial Value Problems	2, 6, 13, 19, 22, 24, 26, 30
2	Jan-Feb 28-1	2.2	Separable Variables	6, 10, 12, 21, 26, 30, 32, 48
		2.3	Linear Equations	4, 12, 15, 18, 20, 22, 28, 30, 36
3	February 4-8	2.4	Exact Equations	5, 8, 12, 20, 28, 30, 31, 34, 42(b), 43
		2.5	Solutions by Substitutions	2, 6, 8, 10, 12, 16, 22, 25, 28, 29
4	February 11-15	2.5	Continuation	
		3.1	Linear Models: Growth and Decay, Newton's Law of Cooling	4, 8, 10, 15, 16, 18, 20
5	February 18-22	4.1.1	Initial-Value and Boundary-Value Problems	2, 4, 6, 10, 12, 13(c), 14(d)
		4.1.2	Homogeneous Equations	16, 22, 24, 25, 28, 30
<b>Major Exam I, Thursday February 22, 2018 at 6:00 PM Material 1.1—3.1</b>				
6	Feb-Mar 25-1	4.1.3	Nonhomogeneous Equations	31, 34, 36 (b, c)
		4.2	Reduction of Order	4, 6, 10, 13, 16, 18, 19
7	March 4-8	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, 25, 28, 32, 34, 44, 48, 50, 61, 64, 68, 71
8	March 11-15	4.5	Continuation	
		4.6	Variation of Parameters	2, 6, 11, 12, 18, 22, 24, 26, 28
9	March 18-22	4.7	Cauchy-Euler Equations( Both Methods)	1, 6, 8, 12, 16, 18, 22, 24, 29, 32, 36, 38, 40
		6.1	Review of Power Series	2, 3, 4, 8, 10, 12, 16
10	March 25-29	6.2	Solutions About Ordinary Points	2, 4, 11, 12, 16, 21, 22
<b>Major Exam II, Thursday March 29, 2018 at 6:30 PM Material 4.1—4.7</b>				
11	April 1-5	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(d,g), 36, 40, 44
12	April 8-12	App II.3	The Eigenvalue Problem	48, 49, 53, 54, 56, 59, 60, 61
		8.1	Preliminary Theory-Linear System	3, 6, 8, 10, 14, 15, 16, 19, 22, 24, 26
13	April 15-19	8.2	Homogeneous Linear System	
		8.2.1	Distinct Real Eigenvalues	2, 7, 9, 10, 14
		8.2.2	Repeated Eigenvalues	22, 24, 26, 27, 29, 30
14	April 22-26	8.2.3	Complex Eigenvalues	34, 37, 38, 42, 46
		8.3.2	Variation of Parameters	12, 14, 15, 28, 30, 31
15	April-May 29-3	8.4	Matrix Exponential (No Laplace Transform)	2, 5, 6, 8, 9, 10, 12
			<b>+ Pace Adjustment and/or Review</b>	
Final Exam Material: Comprehensive Date,Time,and Place will be Announced by the Registrar				

