

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 202 – Syllabus 2017-2018 (173)

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Course Title: Elements of Differential Equations.

Credit: 3-0-3

Text book: 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 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.

IMPORTANT INFORMATION

Grading Policy

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|------------------------------------|---------------------|
| 1. Exam I: | Maximum Points: 100 |
| 2. Exam II: | Maximum Points: 100 |
| 3. Final Exam: | Maximum Points: 140 |
| 4. Class Work | Maximum Points: 60 |
| 5. Quizzes: | Written type |
| 6. Interval of Class Work Average: | [42, 45] |

Exam Questions

The Exam Questions will be based on examples, homework problems and exercises of the textbook.

Policy if one of the Two Major Exams is Missed

1. No makeup exams allowed.
2. If one of the two major exams (Exam-I or Exam-II) is missed for a genuine reason(s) such as medical emergencies, the grade for the missed exam will be calculated based on an existing formula which depends on student's performance in one of the Major exams taken and his performance in the final exam.

Attendance:

1. KFUPM attendance policy will be enforced.
2. A DN grade will be awarded to a student who accumulates **8** unexcused absences.

Academic Integrity

1. All KFUPM policies regarding ethics will be strictly adhered to.

Passing Grade:

2. Passing grade in the course is 50% of 400.

**Week-Wise Breakup of Material
MATH 202-173**

Week	Date	Section	Topics	Suggested Problems
1	June 24 -28	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
		2.2	Separable Equations	5, 6, 10, 12, 19, 21, 25, 29, 32, 46
		2.3	Linear Equations	4, 12, 14, 17, 24, 26, 28, 30, 36
2	June 30* July 1- 5	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
		3.1	Linear Models: Growth & Decay, Newton's Law of Cooling	2, 4, 8, 10, 14, 16, 18a, 19
Major 1: Sections 1.1 – 3.1				
3	Jul 8 - 12	4.1.1	Initial-value & Boundary-value problems	1, 4, 5, 10, 12, 13c, 14d
		4.1.2	Homogeneous Equations	15, 20, 23, 27, 28, 30
		4.1.3	Nonhomogeneous Equations	31, 34, 36a – 36d
		4.2	Reduction of Order	1, 3, 6, 10, 13, 16, 17, 20
4	Jul 15-19	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
		4.6	Variation of Parameters	1, 5, 12, 18, 21, 23, 25, 27
5,	Jul 22-26	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
		6.2	Solutions about Ordinary Points	2, 4, 11, 12, 16, 21, 22
Major 2: Sections 4.1.1 – 4.7				
6	Jul 29 - Aug 02	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
		App II.3	The 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
7	Aug 05- 09	8.2	Homogeneous Linear Systems	
		8.2.1	Distinct Real Eigenvalues	1, 2, 7, 9, 14
		8.2.2	Repeated Eigenvalues	20, 24, 26, 29, 30
		8.2.3	Complex Eigenvalues	34, 37, 42, 46
		8.3.2	Variation of Parameters	11, 14, 18, 28, 30, 32
8	Aug 12	8.4	Matrix Exponential (No Laplace Transform)	1, 5, 6, 8, 9, 10
		Catch-Up & Review		
Final Exam Date: Wednesday, AUGUST 15, 2018, TIME OF EXAM: 8 AM-11AM (Building to be announced.) Material of Final Exam: The final exam will be COMPREHENSIVE				

*: June 30, 2018 is normal Monday class.