

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 202 Syllabus, Term 192

Coordinator: Dr. Husain AlAttas

The Course Code and Name: Math 202, Elements of Differential Equations

The Course Credit Hours: 3-0-3

Textbook: A First Course in Differential Equations by D.G. Zill, 10th Edition

The Course Content: 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

The Course Prerequisite: MATH 102

The Course 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.

The Course Grading Policy:

	Date	Time	Place	Materials	Percentage
Exam I(Written)	February 20, 2020	06:00 – 07:30 pm	TBA	1.1 – 3.1	25% (75 pts)
Exam II(Written)	March 26, 2020	06:30 – 08:00 pm	TBA	4.1 – 4.7	25% (75 pts)
Final Exam(Written)	TBA	TBA	TBA	Comprehensive	35% (105 pts)
Class Work	<ul style="list-style-type: none">▪ It is based on quizzes, class tests, or other class activities determined by the instructor.▪ Any quiz or test should be of a written type and not of a multiple- choice type.▪ The average x (out of 45) of the class work of all sections taught by the same instructor should be in the interval [31.5, 33.75]. ([70%, 75%] of the class work grade).				15% (45 pts)

The Course Passing Grade: A student must score at least 50% (150/300) to pass the course.

Upgrade Policy: The upgrade policy is applied when 3 points out of 300 are needed to get the next higher grade. For instance, the passing grade (D) starts at 150/300. If a student gets 149/300 or 148/300, then his grade will be automatically upgrade to D. However, if a student gets 147/300, his grade will be upgraded to D only if his final exam score is greater than or equal 150/300 (52.5/105).

Exams:

Exam Questions: The questions of the exams are based on the examples, homework problems, and exercises in the textbook.

Cheating in Exams: Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of **F** in the course along with reporting the incident to the higher university administration. Cheating in exams includes (but is not limited to)

- Looking at the papers of other students
- Talking to other students
- Using mobiles or any other electronic devices

Missing an Exam:

Exam I or II: No make-up exam will be given under any circumstances. In case 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 of his performance in the non-missed exam and in the final exam.

Final Exam: If a student misses the final exam for a legitimate reason (such as medical emergencies), he will be given a make-up final exam.

Attendance: Students are expected to attend all lecture and recitation classes.

- If a student misses a class, he is responsible for any announcement made in that class.
- A DN grade will be awarded to any student who accumulates
 - 9 unexcused absences in lecture and recitation classes.
 - 15 excused and unexcused absences in lecture and recitation classes.

(Note: the general rule for DN: 20% unexcused absences of the number of classes, and 33% excused and unexcused absences of the number of classes.)

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by your instructor.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin.

The Weekly Schedule

W	Date	Sec.	Topics	Homework
1	Jan 19-24	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	Jan 26-31	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	Feb 2-6	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	Feb 9-13	2.5	Continue	
		3.1	Linear Models: Growth & Decay, Half-Life, Newton's Law of Cooling	4, 6, 7, 15, 17, 20
Exam I: Thursday February 20, 2020 Time: 06:00-07:30 pm, Place: TBA, Material: [1.1 – 3.1]				
5	Feb 16-20	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
6	Feb 23-27	4.1.3	Nonhomogeneous Equations	31, 34, 36 (a, b, c)
		4.2	Reduction of Order	4, 6, 10, 13, 16, 18, 19
7	Mar 1-5	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	Mar 8-12	4.5	Continuation	

		4.6	Variation of Parameters	2, 4, 6, 11, 12, 18, 22, 24, 26, 27, 28
9	Mar 15-19	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
Exam II: Thursday, March 26, 2020, Time: 06:30-08:00 pm, Place: TBA, Material: [4.1 – 4.7]				
10	Mar 22-26	6.2	Solutions about Ordinary Points	2, 4, 11, 12, 16, 20, 21, 22
11	Mar 29-Apr 2	6.3	Solutions about Singular Points	1, 4, 8, 12, 14, 16, 19, 24, 30, 32
		App II.1 & II.2	Matrices and Linear Systems (Review)	12, 18, 22, 23, 26, 30 (a, b, e), 36, 40, 44
12	Apr 5-9	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	Apr 12-16	8.2	Homogeneous Linear Systems	NA
		8.2.1	Distinct Real Eigenvalues	2, 6, 7, 9, 10, 14
		8.2.2	Repeated Eigenvalues	22, 24, 26, 27, 29, 30
14	Apr 19-23	8.2.3	Complex Eigenvalues	34, 37, 38, 42, 46
		8.3.2	Variation of Parameters	12, 14, 15, 28, 30, 31
15	Apr 26-30	8.4	Matrix Exponential (No Laplace Transform)	1, 5, 6, 8, 9, 10
			Catch -Up & Review	
Comprehensive Final Exam: Please check the Registrar website				