

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 202 Syllabus, Term 201 (A.Y; 2020/2021)

Coordinator: Dr. Othman Echi

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

Course Credit Hours: 3-0-3

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

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

Course Prerequisite: MATH 102

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

Grading Policy:

Type of Assessment	Date	Time	Percentage	Material
Online Assessment 1	Thursday 1/10/2020	TBA	15%	Sections: 1.1 – 2.5
Midterm	Thursday 15/10/2020	TBA	15%	Sections: 3.1, 4.1- 4.2
Online Assessment 2	Thursday 5/11/2020	TBA	15%	Sections: 4.3 – 4.7
Quizzes (5 quizzes)	-----	-----	25%	-----
Classwork			5%	
Final			25%	Comprehensive
Total			100%	

Quizzes (5 quizzes): 25% conducted by each instructor for his sections. The average of each section must lie in the closed interval [70%, 75%] of the weight of the quizzes (25%).

Classwork includes: attendance, discussion or other assessment.

The online assessments 1 and 2 will be of MCQ type

Course Passing Grade: A student must score at least 50% (200/400) to pass the course.

Upgrade Policy: The upgrade policy is applied when 4 points out of 400 are needed to get the next higher grade. For instance, the passing grade (D) starts at 200/400. If a student gets 198/400 or 199/400, then his grade will be automatically upgrade to D. However, if a student gets 197/400 or 196/400, his grade will be upgraded to D only if his final exam score is greater than or equal 200/400 (80/160).

Attendance: Students are expected to attend all lecture 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 either 9 unexcused absences in lecture classes or 15 excused and unexcused absences in lecture classes.**

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

Weekly Schedule

W	Date	Sec.	Topics	Suggested Exercises
1	Aug 30-31 Sep 1-3	1.1	Definitions and Terminology	2, 5, 10, 13, 14, 18, 20, 23, 29, 32, 36, 2, 5, 10, 13, 14, 18, 20, 23, 33, 36, 40,
		1.2	Initial Value Problems	2, 5, 13, 19, 22, 24, 26, 30
2	Sep 6-10	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	Sep 13-17	2.4	Exact Equations	4, 5, 8, 12, 15, 20, 24, 28, 30, 33, 34, 42,
		2.5	Solutions by Substitutions	2, 6, 8, 10, 12, 16, 22, 25, 28, 29
4	Sep 20-22	2.5	Continue	
		3.1	Linear Models: Growth & Decay, Newton's Law of Cooling	4, 6, 7, 15, 17, 20
	Sep 23-24		Wednesday, Thursday:	National Day Holydays
5	Sep 27- 30, Oct 1	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	Oct 4-8	4.1.3	Nonhomogeneous Equations	31, 34, 36 (a, b, c)
		4.2	Reduction of Order	4, 6, 10, 13, 16, 18, 19
7	Oct 11-15	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	Oct 18-22	4.5	Continuation	
		4.6	Variation of Parameters	2, 4, 6, 11, 12, 18, 22, 24, 26, 27, 2, 4, 6, 11, 12, 18, 22, 28, 30, 31,
9	Oct 25-29	4.7	Cauchy-Euler Equation (Both Methods)	1, 8, 9, 11, 16, 18, 22, 29, 32, 36, 38,
		6.1	Review of Power Series	2, 3, 4, 8, 10, 12, 16, 24, 29
10	Nov 1-5	6.2	Solutions about Ordinary Points	2, 4, 11, 12, 16, 20, 21, 22

11	Nov 8-12	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,
12	Nov 15-19	App II.3	Eigenvalue Problem	48, 49, 53, 54, 56, 59, 60,
		8.1	Preliminary Theory-Linear Systems	2, 3, 6, 8, 10, 14, 15, 16, 19, 22, 24, 25, 26
13	Nov 22-26	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
14	Nov 29-30, Dec 1-3	8.2.3	Complex Eigenvalues	34, 36, 37, 38, 39, 40, 42, 44
		8.3.2	Variation of Parameters	12, 14, 15, 16, 17, 28, 30, 32
15	Dec 6-10	8.4	Matrix Exponential (No Laplace Transform)	1, 5, 6, 8, 9, 10
16	Dec 13		Review (Normal Wednesday Class)	
	Dec 14		Review (Normal Thursday Class)	