

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 202 Syllabus, Term 202

Coordinator: 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. Solve different types of first-order differential equations, including separable, exact, homogeneous, linear and Bernoulli equations.
2. Discuss basic theory of linear differential equations.
3. Solve real-world problems related to growth and decay, and heating and cooling.
4. Find general solution of homogeneous linear differential equations with constant and variable coefficients.
5. Apply the methods of undetermined coefficients and variation of parameters to solve nonhomogeneous linear differential equations.
6. Use series method to solve a second order differential equation.
7. Solve systems of linear homogeneous and nonhomogeneous differential equations.

The Course Grading Policy:

	Date	Time	Place	Materials	Percentage
Midterm Exam	Monday, 15 March, 2021	7:00 PM	Online	[1.1, 4.3]	25% (75 pts)
Final Exam	TBA	TBA	In-Person	Comprehensive	40% (120 pts)
Class Work	<ul style="list-style-type: none">▪ It is based on quizzes, class tests, or other class activities determined by the instructor.▪ The average x (out of 60) of the class work of each section should be in the interval [42, 45] ([70%, 75%] of the class work grade).				20% (60 pts)
Homework	<ul style="list-style-type: none">▪				15% (45 pts)

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

Midterm: No make-up exam will be given under any circumstances.

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.)

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

The Weekly Schedule

W	Date (2021)	Sec.	Topics	Book Edition	Homework
1	Jan 17-21	1.1	Definitions and Terminology	10 th	6, 9, 13, 14, 18, 20, 23, 29, 32, 36, 38
				11 th	6, 9, 13, 14, 18, 20, 23, 33, 36, 40, 42
		1.2	Initial Value Problems	10 th and 11 th	2, 5, 13, 19, 22, 24, 26, 30
2	Jan 24-28	2.2	Separable Variables	10 th and 11 th	6, 10, 12, 21, 24, 26, 30, 32, 48
		2.3	Linear Equations	10 th and 11 th	4, 12, 15, 18, 20, 22, 28, 30, 36
3	Jan 31-Feb 4	2.4	Exact Equations	10 th and 11 th	4, 5, 8, 12, 15, 20, 24, 28, 30, 33, 34, 42, 43
		2.5	Solutions by Substitutions	10 th and 11 th	2, 6, 8, 10, 12, 16, 22, 25, 28, 29
4	Feb 7-11	2.5	Continue		
		3.1	Linear Models: Growth & Decay, Half-Life, Newton's Law of Cooling	10 th and 11 th	4, 6, 7, 15, 17, 20
5	Feb 14-18	4.1.1	Initial and Boundary Value Problems	10 th and 11 th	2, 4, 6, 10, 12, 13 (c), 14(d)
		4.1.2	Homogeneous Equations	10 th and 11 th	16, 22, 24, 25, 28, 30
6	Feb 21-25	4.1.3	Nonhomogeneous Equations	10 th and 11 th	31, 34, 36 (a, b, c)
		4.2	Reduction of Order	10 th and 11 th	4, 6, 10, 13, 16, 18, 19
7	Feb 28-Mar	4.3	Homogeneous Linear Equations with Constant	10 th and 11 th	5, 8, 12, 14, 18, 22, 28, 32, 36, 42, 49, 50

	4		Coefficients		
		4.5	Undetermined Coefficients: Annihilator Approach	10 th and 11 th	2, 8, 14, 20, 23, 25, 28, 32, 34, 44, 48, 50, 61, 64, 68, 71
8	Mar 7-11	4.5	Continuation		
		4.6	Variation of Parameters	10 th	2, 4, 6, 11, 12, 18, 22, 24, 26, 27, 28
				11 th	2, 4, 6, 11, 12, 18, 22, 28, 30, 31, 32
9	Mar 14-18	4.7	Cauchy-Euler Equation (Both Methods)	10 th and 11 th	1, 8, 9, 11, 16, 18, 22, 29, 32, 36, 38, 40
		6.1	Review of Power Series	10 th and 11 th	2, 3, 4, 8, 10, 12, 16
10	Mar 21-25	6.2	Solutions about Ordinary Points	10 th and 11 th	2, 4, 11, 12, 16, 20, 21, 22
11	Mar 28-Apr 1	6.3	Solutions about Singular Points	10 th and 11 th	1, 4, 8, 12, 14, 16, 19, 24, 30, 32
		App II.1 & II.2	Matrices and Linear Systems (Review)	10 th and 11 th	12, 18, 22, 23, 26, 30 (a, b, e), 36, 40, 44
12	Apr 4-8	App II.3	Eigenvalue Problem	10 th and 11 th	48, 49, 53, 54, 56, 59, 60, 61
		8.1	Preliminary Theory-Linear Systems	10 th and 11 th	2, 3, 6, 8, 10, 14, 15, 16, 19, 22, 24, 25, 26
13	Apr 11-15	8.2	Homogeneous Linear Systems		NA
		8.2.1	Distinct Real Eigenvalues	10 th and 11 th	2, 6, 7, 9, 10, 14
		8.2.2	Repeated Eigenvalues	10 th	22, 24, 26, 27, 29, 30
				11 th	24, 26, 28, 29, 31, 32
14	Apr 18-22	8.2.3	Complex Eigenvalues	10 th	34, 37, 38, 42, 46
				11 th	36, 39, 40, 44, 48
		8.3.2	Variation of Parameters	10 th	12, 14, 15, 28, 30, 31
				11 th	14, 16, 17, 30, 32, 33
15	Apr 25-29	8.4	Matrix Exponential (No Laplace Transform)	10 th and 11 th	1, 5, 6, 8, 9, 10
			Catch -Up & Review		
Comprehensive Final Exam: Please check the Registrar website					