

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 202 Syllabus, Term 213

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, 11th 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 infinite series method to solve second order linear variable coefficient differential equations.
7. Solve systems of linear homogeneous and nonhomogeneous differential equations.

The Course Grading Policy:

	Date	Time	Place	Materials	Percentage
Exam I (Written + MCQ)	Thursday, 23 June 2022	7:00 PM	TBA	[1.1 – 3.1]	25% (100 pts)
Exam II (Written + MCQ)	Sunday, 24 July 2022	7:00 PM	TBA	[4.1 – 4.7]	25% (100 pts)
Final Exam (Written + MCQ)	Please check the Registrar website	Please check the Registrar website	Please check the Registrar website	Comprehensive	35% (140 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).				15% (60 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 **DN** 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

Please note that Students are not allowed to carry mobile phones or any other electronic devices like Smart Watches to the exam halls.

Missing an Exam: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he must bring an official excuse from the Deanship of Students Affairs. Otherwise, he will get zero in the missed exam. No make-up exam will be given under any circumstances if a student missed Exam I or Exam II.

Attendance: Students are expected to attend all classes.

- If a student misses a class, he is responsible for any announcement made or material covered in that class.
- Students need to strictly adhere to the attendance policy of the university. A DN grade will be awarded to any student who accumulates
 - 8 unexcused absences.
 - 13 excused and unexcused absences.

(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. Also, DN-Grade will be assigned to the eligible students after their instructors have warned them twice.)

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 the instructor.

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

Week #	Date	Section	Topics	Suggested Review Exercises
1	June 05 – 09	1.1	Definitions and Terminology	6, 9, 13, 14, 18, 20, 23, 33, 36, 40, 42
		1.2	Initial Value Problems	2, 5, 13, 19, 22, 24, 26, 30
		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
2	June 12 – 16	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
		3.1	Linear Models: Growth & Decay, Newton's Law of Cooling	4, 6, 7, 15, 17, 20
Exam I: Thursday, 23 June 2022, 7:00 PM, Material:[1.1 — 3.1]				
3	June 19 – 23	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
		4.1.3	Nonhomogeneous Equations	31, 34, 36 (a, b, c)
		4.2	Reduction of Order	4, 6, 10, 13, 16, 18, 19
4	June 26 – 30	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
		4.6	Variation of Parameters	2, 4, 6, 11, 12, 18, 22, 28, 30, 31, 32
Exam II: Sunday, 24 July 2022: 7:00 PM, Material: [4.1 — 4.7]				
5	July 17 – 21	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
		6.2	Solutions about Ordinary Points	2, 4, 11, 12, 16, 20, 21, 22
6	July 24 – 28	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

		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
7	July 31 – Aug 4	8.2	Homogeneous Linear Systems	
		8.2.1	Distinct Real Eigenvalues	2, 6, 7, 9, 10, 14
		8.2.2	Repeated Eigenvalues	24, 26, 28, 29, 31, 32
		8.2.3	Complex Eigenvalues	36, 39, 40, 44, 48
		8.3.2	Variation of Parameters	14, 16, 17, 30, 32, 33
8	Aug 7 – 8	8.4	Matrix Exponential (No Laplace Transform)	1, 5, 6, 8, 9, 10
			Catch -Up & Review	
Final Exam: Please check the Registrar Website Material: Comprehensive				