King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

MATH 202 Syllabus, Term 211

Coordinator: Dr. Bader Al Humaidi

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 non-homogeneous 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
Exam I (written +MCQ)	30/9/21	6:00 -8:00 PM	Bldg 57	1.1-3.1	25% (75 pts)
Exam II (written +MCQ)	4/11/21	7:00-9:00 PM	Bldg 57	4.1-4.7	25% (75pts)
Final Exam (written +MCQ)	TBA	TBA	TBA	comprehensive	35% (105 pts)
Class Work	▪ It is based on quizzes, class tests, or other class activities determined by the instructor. ▪ The average x (out of 30) of the class work of each section should be in the interval [21, 22.5] ([70%, 75%] of the class work grade).				10% (30pts)
HW	See the Weekly Table				5% (15 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

Attendance: Students are expected to attend all lecture.

- 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
  - 8 unexcused absences in lecture classes.
  - 12 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.

Week #	Date	Text Sections	Topic		Suggested Review Exercises
1	Aug. 29-Sep.2	1.1	Definitions and Terminology	10th 11th	6, 9, 13, 14, 18, 20, 23, 29, 32, 36, 38 6, 9, 13, 14, 18, 20, 23, 33, 36, 40, 42
		1.2	Initial Value Problems	10th and11th	2, 5, 13, 19, 22, 24, 26, 30
2	Sep. 5-9	2.2	Separable Variables	10th and11th	6, 10, 12, 21, 24, 26, 30, 32, 48
		2.3	Linear Equations	10th and11th	4, 12, 15, 18, 20, 22, 28, 30, 36
3	Sep. 12-16	2.4	Exact Equations	10th and11th	4, 5, 8, 12, 15, 20, 24, 28, 30, 33, 34, 42, 43
		2.5	Solutions by Substitutions	10th and11th	2, 6, 8, 10, 12, 16, 22, 25, 28, 29
4	Sep. 19-22	2.5	Continue		
		3.1	Linear Models: Growth & Decay, Newton's Law of Cooling	10th and11th	4, 6, 7, 15, 17, 20
National Day Holiday: Sep. 23					
5	Sep. 26-30	4.1.1	Initial and Boundary Value Problems	10th and11th	2, 4, 6, 10, 12, 13 (c), 14(d)
		4.1.2	Homogeneous Equations	10th and11th	16, 22, 24, 25, 28, 30
6	Oct. 3-7	4.1.3	Nonhomogeneous Equations	10th and11th	31, 34, 36 (a, b, c)
		4.2	Reduction of Order	10th and11th	4, 6, 10, 13, 16, 18, 19
7	Oct. 10-14	4.3	Homogeneous Linear Equations with Constant Coefficients	10th and11th	5, 8, 12, 14, 18, 22, 28, 32, 36, 42, 49, 50
		4.5	Undetermined Coefficients:Annihilator Approach	10th and11th	2, 8, 14, 20, 23, 25, 28, 32, 34, 44, 48, 50, 61, 64, 68, 71
Students Break Oct. 17					
8	Oct. 18-21	4.5	Continue		
		4.6	Variation of Parameters	10th 11th	2, 4, 6, 11, 12, 18, 22, 24, 26, 27, 28 2, 4, 6, 11, 12, 18, 22, 28, 30, 31, 32
9	Oct. 24-28	4.7	Cauchy-Euler Equation (BothMethods)	10th and11th	1, 8, 9, 11, 16, 18, 22, 29, 32, 36, 38, 40
		6.1	Review of Power Series	10th and11th	2, 3, 4, 8, 10, 12, 16
10	Oct.31-Nov .4	6.2	Solutions about Ordinary Points	10th and11th	2, 4, 11, 12, 16, 20, 21, 22
11	Nov. 7-11	6.3	Solutions about Singular Points	10th and11th	1, 4, 8, 12, 14, 16, 19, 24, 30, 32
		App II.1 &II.2	Matrices and Linear Systems (Review)	10th and11th	12, 18, 22, 23, 26, 30 (a, b, e), 36, 40, 44

12	Nov. 14-18	App II.3	Eigenvalue Problem	10^{th} and11^{th}	48, 49, 53, 54, 56, 59, 60, 61
		8.1	Preliminary Theory-Linear Systems	10^{th} and11^{th}	2, 3, 6, 8, 10, 14, 15, 16, 19, 22, 24, 25, 26
13	Nov. 21-25	8.2	Homogeneous Linear Systems		
		8.2.1	Distinct Real Eigenvalues	10^{th} and11^{th}	2, 6, 7, 9, 10, 14
		8.2.2	Repeated Eigenvalues	10^{th} 11^{th}	22, 24, 26, 27, 29, 30 24, 26, 28, 29, 31, 32
Midterm Break: Nov. 28-Dec. 2					
14	Dec. 5-9	8.2.2	Continue	10^{th} 11^{th}	34, 37, 38, 42, 46 36, 39, 40, 44, 48
		8.2.3	Complex Eigenvalues	10^{th} 11^{th}	34, 37, 38, 42, 46 36, 39, 40, 44, 48
15	Dec. 12-16	8.3.2	Variation of Parameters	10^{th} 11^{th}	12, 14, 15, 28, 30, 31 14, 16, 17, 30, 32, 33
		8.4	Matrix Exponential (No Laplace Transform)	10^{th} and11^{th}	1, 5, 6, 8, 9, 10
16	Dec. 19-20		Catch-Up and Review		