

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**

Department of Mathematics

**Math208 Course Syllabus**

Term – 221

Coordinator: **Bader Al Humaidi**

([humaidib@kfupm.edu.sa](mailto:humaidib@kfupm.edu.sa))

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**Course Title:** Math208 (Introduction to Differential Equations and Linear Algebra)

**Credits:** 3-0-3

**Textbook:** Differential Equations and Linear Algebra, C.H. Edwards and D.E. Penny, Prentice Hall, Third Edition (2014)

**Objectives:** The course introduces elementary differential equations and linear algebra to students of Computer Science, Computer Engineering, System Engineering and Earth Science

**Learning Outcomes:** Upon successful completion of this course, a student should be able to:

- Solve various types of ordinary differential equations.
- Apply differential equations to solve certain real-world problems.
- Discuss basic concepts of linear algebra.
- Use linear algebra techniques to solve linear systems of differential equations with constant coefficients.

**The Course Grading Policy:**

	Date	Time	Place	Materials	Percentage
<b>Exam I (MCQ+ written)</b>	3/10/22	6:00 PM	BLD 54	1.1-3.6	25% (100 pts)
<b>Exam II (MCQ + written)</b>	7/11/22	6:00 PM	BLD 54	4.1-5.5	25% (100pts)
<b>Final Exam (TBA)</b>	TBA	TBA	TBA	comprehensive	35% (140 pts)
<b>Class Work</b>	<ul style="list-style-type: none"><li>▪ It is based on quizzes, class tests, or other class activities determined by the instructor.</li><li>▪ The average <math>x</math> (out of 40) of the class work of each section should be in the interval <math>[28, 30]</math> (<math>[70\%, 75\%]</math> of the class work grade).</li></ul>				10% (40pts)
<b>HW</b>	The Homework will be online through the blackboard				5% (20 pts)

### **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 Students Affairs. Otherwise, he will get zero in the missed exam.

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

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

**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

### **Important Exam Rules:**

- No student will be allowed to take the exam if he doesn't bring his KFUPM, National, or Iqama ID card with him to the exam hall.
- Students are not allowed to carry mobiles, smart watches, or electronic devices to the exam halls/rooms.
- Students must take the exam in the place assigned to them.

**Letter Grades:** The letter grades are based on curve grading, which will depend on the average of all students taking the course.

Week	Dates	Section	Topic	Suggested Review Exercises
1	Aug. 28-Sep.1	1.1	Differential Equations & Math. Models ( <b>Only Decay &amp; Growth</b> )	2,6, 8,10,14,20,35,38
		1.2	Integrals as General & Particular Solutions	2, 4, 6, 8, 11, 17
2	Sep. 4-8	1.4	Separable Equations ( <b>Without Applications</b> )	2, 8, 10, 24, 26, 34,40
		1.5	Linear First Order Equations	
3	Sep. 11-15	1.5	Linear First Order Equations (Cont.)	2, 8, 10, 21, 28, 32
		1.6	Substitution Methods & Exact Eqs. ( <b>Only Exact Eqs</b> )	32, 36, 40, 42
4	Sep. 18-21	3.1-3.6	<b>Review only:</b> Linear Systems, Matrices & Gaussian Elimination, Reduced Row-Echelon Form, Matrix Operations, Inverse Matrices, Determinants	<b>Sec 3.1:</b> 4, 13, 18, 24, 28 <b>Sec 3.2:</b> 2, 10, 15, 28 <b>Sec 3.3:</b> 2, 6, 10, 26, 28 <b>Sec 3.4:</b> 1, 10, 14, 25 <b>Sec 3.5:</b> 3, 8, 23
<b>National Day Holiday: Sep. 22</b>				
5	Sep. 25-29	3.6	Inverse & the Adjoint Matrix	<b>Sec 3.6:</b> 2,7,17,21 33,38 1, 4, 6, 8, 10, 16, 19, 20 2, 8, 12, 14, 17, 26
		4.1	The Vector Space $\mathbb{R}^3$	
		4.2	The Vector Space $\mathbb{R}^n$ & Subspaces	
6	Oct. 2-6	4.3	Linear Combination & Independence of Vectors	2,6,12,17,25
		4.4	Bases & Dimension for Vector Spaces	2, 9, 12, 13, 16, 23
		4.5	Row & Column Spaces	1,4,8,12,14,16
7	Oct. 9-13	5.1	Introduction: Second Order Linear Equations	2, 10, 15, 19, 26,28,43
		5.2	General Solutions of Linear Equation	3, 9, 14, 22, 26
8	Oct. 16-20	5.3	Homogeneous Eqs. With Constant Coefficients	3,4,14,19,22,28,31,33,39
		5.5	Nonhomogeneous Eqs. & Undetermined Coefficients	1, 4, 8, 16, 21, 27, 42, 44
9	Oct. 23-27	5.5	Method of Variation of Parameters	48, 52, 57, 58, 62
		7.1	First Order Systems & Applications	1,3,8,14,20,21
10	Oct.30-Nov .3	7.2	Matrices & Linear Systems	1, 6, 12, 16, 20,24
		6.1	Introduction to Eigenvalues	3, 7, 14, 25,31
11	Nov. 6-10	7.3	The Eigenvalue Method for Linear Systems	1, 3, 9, 18, 25, 26
12	Nov. 13-17	6.2	Diagonalization of Matrices	2, 10, 15, 18, 27
		6.3	<b>Only</b> The Caley Hamilton Theorem	2, 15, 18, 22
13	Nov. 20-24	7.5	Multiple Eigenvalue Solutions	4, 9, 13, 16, 25, 28, 31
			Jordan Normal Form	38, 40, 43
<b>Midterm Break: Nov. 27-Dec. 01</b>				
14	Dec. 4-8	8.1	Matrix Exponentials & Linear Systems	2, 6, 10, 24, 26
15	Dec. 11-15	8.2	Nonhomogeneous Linear Systems (only Variation of Parameters Method)	17, 19, 26, 32
16	Dec. 18	8.2	Catch-up and Review	Normal Thursday Classes