

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**

Department of Mathematics & Statistics

**Math208 Course Syllabus**

Term – 192

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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:

- Find bases of vector spaces.
- Use linear algebra in systems of linear equations.
- Solve eigenvalue problem.
- Perform diagonalization and compute the Jordan form of matrices.
- Solve first order differential equations and related models.
- Solve linear ordinary differential equations.
- Solve systems of ordinary differential equations.

**Grading Policy:**

<b>Exam I</b> Common Exam (Written)	<b>Date:</b> Thurs: Feb 20, 2020	<b>Place:</b> TBA	25% (75 Points)
	<b>Time:</b> TBA	<b>Material:</b> 1.1 – 3.6	
<b>Exam II</b> Common Exam (Written)	<b>Date:</b> Thurs: Mar 26, 2020	<b>Place:</b> TBA	25% (75 Points)
	<b>Time:</b> TBA	<b>Material:</b> 4.1 – 7.2	
<b>Final Exam</b> Common Exam Comprehensive	<b>Date:</b> Thurs: May 6, 2020	<b>Place:</b> TBA	35% (105 Points)
	<b>Time:</b> 1:00 AM – TBA.	<b>Material:</b> Comprehensive	
<b>Class Work</b>	<b>Class Activities:</b> It is based on HW, quizzes, class tests, or other class activities determined by the instructor. Any quiz or test under class activity should be of written type. The average $x$ (out of 45) of class activities of the sections taught by the same instructor should be in the interval $[31.5, 33.75]$ .		15% (45 Points)

**Passing Grade:**

A student should achieve at least **50% (150 Points)** to pass this course.

**Exam Questions:**

Questions of the common exams are based on examples, homework problems and exercises in the textbook.

**Missing Exam I or Exam II:**

No makeup exam will be given under any circumstance. In case, a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula which depends on his performance in the non-missing exam and in the final exam.

**Attendance:**

Attendance is a University Requirement (see p. 38 of the Undergraduate Bulletin 2006-2009). A DN grade will be awarded to any student who accumulates 09 unexcused absences.

**Academic Integrity:**

All KFUPM policies regarding ethics apply to this course.

### Pacing Schedule

W	Date	Section	Topic	Suggested Homework
1	Jan 19 – 23	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	Jan 26 – 30	1.4	Separable Equations ( <b>Without Applications</b> )	2, 8, 10, 24, 26, 34,40
		1.5	Linear First Order Equations	
3	Feb 2 – 6	1.5	Linear First Order Equations (Cont.)	2, 8, 10, 21, 28, 32
		1.6	Substitution Methods & Exact Eqs. ( <b>Only Exact Eqs</b> )	
4	Feb 9 – 13	1.6	Substitution Methods & Exact Eqs ( <b>Only Exact Eqs.</b> )	32, 36, 40, 42
		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
		3.6	Inverse & the Adjoint Matrix	<b>Sec 3.6:</b> 2,7,17,21 33, 38
5	Feb 16 – 20	4.1	The Vector Space $\mathbb{R}^3$	1, 4, 6, 8, 10, 16, 19, 20
		4.2	The Vector Space $\mathbb{R}^n$ & Subspaces	2, 8, 12, 14, 17, 26
		4.3	Linear Combination & Independence of Vectors	2, 6, 12, 17, 25
<b>First Major Exam: February 20</b>				
6	Feb 23 – 27	4.4	Bases & Dimension for Vector Spaces	2, 9, 12, 13, 16, 23
		4.5	Row & Column Spaces ( <b>Rank of Matrices Only</b> )	1,4,8,12,14,16
		5.1	Introduction: Second Order Linear Equations	2, 10, 15, 19, 26, 28, 43
7	Mar 1 – 5	5.2	General Solutions of Linear Equations	3, 9, 14, 22, 26
		5.3	Homogeneous Eqs. With Constant Coefficients	3,4,14,19,22,28,31,33,39
8	Mar 8 – 12	5.5	Nonhomogeneous Eqs. & Undetermined Coefficients	1, 4, 8, 16, 21, 27, 42, 44
		5.5	Method of Variation of Parameters	48, 52, 57, 58, 62
9	Mar 15 – 19	7.1	First Order Systems & Applications	1,3,8,14,20,21
		7.2	Matrices & Linear Systems	1, 6, 12, 16, 20, 24
10	Mar 22 – 26	6.1	Introduction to Eigenvalues	3, 7, 14, 25,31
		7.3	The Eigenvalue Method for Linear Systems	
<b>Second Major Exam: March 26</b>				
11	Mar 29 – April 2	7.3	The Eigenvalue Method for Linear Systems (Cont.)	1, 3, 9, 18, 25, 26
		6.2	Diagonalization of Matrices	2, 10, 15, 18, 27
12	April 5 – 9	6.3	<b>Only</b> The Caley Hamilton Theorem	2, 15, 18, 22
		7.5	Multiple Eigenvalue Solutions	
13	April 12 – 16	7.5	Multiple Eigenvalue Solutions (Cont.)	4, 9, 13, 16, 25, 28, 31
			Jordan Normal Form	38, 40, 43
14	April 19 – 23	8.1	Matrix Exponentials & Linear Systems	2, 6, 10, 24, 26
		8.2	Nonhomogeneous Linear Systems ( <b>Only Variation of Parameters Method</b> )	
15	April 26 – 30	8.2	Nonhomogeneous Linear Systems (Cont.) Catch-up and Review	17, 19, 26, 32
<b>Final Exam: May 6, 2020</b>				