

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

Department of Mathematics & Statistics

Math208 Course Syllabus

Term – 181

Coordinator: **Dr. Abdulilah Kadri**

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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 **systems of linear algebraic equations** by **elimination of variables**.
- Write **systems of linear equations** in the form of matrices and **solve** them by **performing elementary row operations**.
- Find **inverse and eigenvalues & eigenvectors** of matrices.
- Clearly understand **vector spaces, subspaces, bases** and their **dimensions**.
- Apply **eigenvalues and eigenvectors** to **diagonalize matrices** and construct **block diagonal** and **Jordan forms for matrices** where eigenvalues have incomplete multiplicity.
- Recognize and solve **linear first order, separable** and **exact differential equations** and apply them to **mixture, growth** and **decay problems**.
- Solve **homogeneous differential equations** with **constant coefficients**.
- Apply **Wronskian** to determine **linear independence/dependence of solutions of differential equations**.
- Apply **methods of undetermined coefficients** and **variation of parameters** to solve **non-homogeneous differential equations**.
- Write **systems of differential equations** in matrix form and solve them by applying **method of eigenvalues and eigenvectors**.

Grading Policy:

Exam I Common Exam (Written)	Date: Thursday: 4-10-2018	Place: Bldg 57	25% (100 Points)
	Time: 5:45 - 7:15 PM	Material: 1.1 – 3.6	
Exam II Common Exam (Written)	Date: Thursday: 08-11-2018	Place: Bldg 57	25% (100 Points)
	Time: 5:15 - 7:15 PM	Material: 4.1 – 7.2	
Final Exam Common Exam Comprehensive	Date: Sunday: 16-12-2018	Place: TBA	35% (140 Points)
	Time: 7:30 AM	Material: Comprehensive	
Class Work	Class Activities: 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 60) of class activities of the sections taught by the same instructor should be in the interval [36,45].		15% (60 Points)

Passing Grade: A student should achieve at least **50% (200 Points)** to pass this course.

Exam Questions: Questions of the common exams are based on examples, homework problems and exercises in the text book.

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

Week	Date	Section	Topic	Suggested Homework
1	Sep. 2 – 6	1.1	Differential Equations & Math. Models (Only Decay & Growth)	2,6, 8,10,14,20,35,38
		1.2	Integrals as General & Particular Solutions	2, 4, 6, 8, 11, 17
2	Sep. 9 – 13	1.4	Separable Equations (Without Applications)	2, 8, 10, 24, 26, 34,40
		1.5	Linear First Order Equations	
3	Sep. 16 – 20	1.5	Linear First Order Equations (Cont.)	2, 8, 10, 21, 28, 32
		1.6	Substitution Methods & Exact Eqs. (Only Exact Eqs)	
23 September: National Day Holiday				
4	Sep. 25 – 27	1.6	Substitution Methods & Exact Eqs (Only Exact Eqs.)	32, 36, 40, 42
		3.1-3.6	Review only: Linear Systems, Matrices & Gaussian Elimination, Reduced Row-Echelon Form, Matrix Operations, Inverse Matrices, Determinants	Sec 3.1: 4, 13, 18, 24, 28 Sec 3.2: 2, 10, 15, 28 Sec 3.3: 2, 6, 10, 26, 28 Sec 3.4: 1, 10, 14, 25 Sec 3.5: 3, 8, 23 Sec 3.6: 2,7,17,21 33, 38
		3.6	Inverse & the Adjoint Matrix	
5	Sep. 29 – Oct. 4 (<i>Sept. 29: Normal Sunday Class</i>)	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
First Major Exam: October 4				
6	Oct. 7 - 11	4.4	Bases & Dimension for Vector Spaces	2, 9, 12, 13, 16, 23
		4.5	Row & Column Spaces (Rank of Matrices Only)	1,4,8,12,14,16
		5.1	Introduction: Second Order Linear Equations	2, 10, 15, 19, 26, 28, 43
7	Oct. 14 - 18	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	Oct. 21 - 25	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	Oct 28 – Nov. 1	7.1	First Order Systems & Applications	1,3,8,14,20,21
		7.2	Matrices & Linear Systems	1, 6, 12, 16, 20, 24
10	Nov. 4 - 8	6.1	Introduction to Eigenvalues	3, 7, 14, 25,31
		7.3	The Eigenvalue Method for Linear Systems	
Second Major Exam: November 8				
11	Nov. 11 - 15	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	Nov. 18 - 22	6.3	Only The Caley Hamilton Theorem	2, 15, 18, 22
		7.5	Multiple Eigenvalue Solutions	
13	Nov. 25 - 29	7.5	Multiple Eigenvalue Solutions (Cont.)	4, 9, 13, 16, 25, 28, 31
			Jordan Normal Form	38, 40, 43
14	Dec. 2 - 6	8.1	Matrix Exponentials & Linear Systems	2, 6, 10, 24, 26
		8.2	Nonhomogeneous Linear Systems (Only Variation of Parameters Method)	
15	Dec. 9 - 13	8.2	Nonhomogeneous Linear Systems (Cont.) Catch-up and Review	17, 19, 26, 32
Final Exam: December 16				