

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

MATH 260 – Syllabus Term 172

Coordinator: Dr. Suliman Al-Homidan

Title : Math260 (Introduction to Differential Equations and Linear Algebra)

Credit : 3-0-3

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

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

Learning Outcomes: Upon completion of this course, students 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, Feb. 22, 2018	Place: BLG 57	25% (100 Points)
	Time: 5.45 PM-7.45 PM	Material: 1.1 – 4.2	
Exam II Common Exam (Written)	Date: Thursday, Mar. 29, 2018	Place: BLG 57	25% (100 Points)
	Time: 5.45 PM-7.45 PM	Material: 4.3 – 6.1	
Final Exam Common Exam Comprehensive	Date: Sunday, May 06, 2018	Place: TBA	35% (140 Points)
	Time: 07.00 PM	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 miss 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 (2018)	Section	Topics (24 Sections)	Suggested Homework
1	Jan. 21-25	1.1	Differential Equations & Math. Models (Only Decay & Growth)	2,6, ,10,14,20,35,38
		1.2	Integrals as General & Particular Solutions	2, 4, 6, 8, 11, 17
2	Jan. 28- Feb. 1	1.4	Separable Equations (Without Applications)	2, 8, 10, 24, 26, 34,40
		1.5	Linear First Order Eqs.	
3	Feb.04-08	1.5	Linear First-Order Eqs. (cont.)	2, 8, 10, 21, 28, 32
		1.6	Substitution Methods & Exact Eqs. – Only Exact Eqs	
4	Feb. 11- 15	1.6	Substitution Methods & Exact Eqs - Only Exact Eqs.	32, 36, 40, 42 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
		3.1-3.6	Review only: Linear Systems, Matrices & Gaussian Elimination, Reduced Row-Echelon Form, Matrix Operations, Inverse Matrices, Determinants	
		3.6	Inverse & the Adjoint Matrix	
5	Feb. 18-22	4.1	The Vector Space R^3	1, 4, 6, 8, 10, 16, 19, 20 2, 8, 12, 14, 17, 26 2, 6, 12, 17, 25
		4.2	The Vector Space R^n & Subspaces	
		4.3	Linear Combination & Independence of vectors	
Major Exam I (1.1 – 4.2). Thursday, Feb. 22, 2018 at 05:45 PM				
6	Feb 25- Mar. 01	4.4	Bases & Dimension for vector spaces	2, 9, 12, 13, 16, 23 1,4,8,12,14,16 2, 10, 15, 19, 26, 28, 43
		4.5	Row & Column Spaces (Rank of Matrices only)	
		5.1	Introduction: Second Order Linear Equations	
7	Mar. 04- 08	5.2	General solutions of Linear Eqs.	3, 9, 14, 22, 26 3,4,14,19,22,28,31,33,39
		5.3	Homogeneous Eqs. with Constant Coefficients	
8	Mar 11-15	5.5	Nonhomogeneous Eqs. & Undetermined Coefficients	1, 4, 8, 16, 21, 27, 42, 44 48, 52, 57, 58, 62
		5.5	Method of Variation of Parameters	
9	Mar 18- 22	7.1	First Order Systems & Applications	1,3,8,14,20,21 1, 6, 12, 16, 20, 24
		7.2	Matrices & Linear Systems	
10	Mar 25-29	6.1	Introduction to Eigenvalues	3, 7, 14, 25,31
		7.3	The Eigenvalue Method for Linear Systems	
Major Exam II (4.3 – 6.1). Thursday, Mar. 29, 2018 at 05:45 PM				
11	Apr 01- Apr. 05	7.3	The Eigenvalue Method for Linear Systems - Continued	1, 3, 9, 18, 25, 26 2, 10, 15, 18, 27
		6.2	Diagonalization of Matrices	
12	Apr. 08- 12	6.3	Only The Caley Hamilton Theorem	2, 15, 18, 22
		7.5	Multiple Eigenvalue Solutions	
13	Apr. 15-19	7.5	Multiple Eigenvalue Solutions (continued)	4, 9, 13, 16, 25, 28, 31 38, 40, 43
			Jordan Normal Form	
14	Apr. 22- 26	8.1	Matrix Exponentials & Linear Systems	2, 6, 10, 24, 26
		8.2	Nonhomogeneous Linear Systems (Only Variation of Parameters Method)	
15	Apr 29- May. 03	8.2	Nonhomogeneous Linear Systems - Continued Catch-up and Review	17, 19, 26, 32
Final Exam (Comprehensive). Sunday, May. 06, 2018 at 07.00 PM				