KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

Department of Mathematics

Math 208 Syllabus, Summer Session 213 (2021-2022)

Coordinator: Dr. Ibrahim Al-Rasasi (irasasi@kfupm.edu.sa)

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:

1. Find bases of vector spaces.
2. Use linear algebra in solving systems of linear equations.
3. Solve the eigenvalue problem.
4. Perform diagonalization and compute the Jordan form of matrices.
5. Solve first order differential equations and related models.
6. Solve linear ordinary differential equations.
7. Solve systems of ordinary differential equations.

The Course Grading Policy:

	Date	Time	Place	Material	Percentage
Exam I (MCQ+ Written)	Thursday, June 23, 2022	TBA	TBA	1.1-3.6	25% (100 pts)
Exam II (MCQ + Written)	Sunday, July 24, 2022	TBA	TBA	4.1-5.5	25% (100pts)
Final Exam (TBA)		TBA	TBA	comprehensive	35% (140 pts)
Class Work	▪ It is based on HW, quizzes, class tests, or other class activities determined by the instructor. ▪ The average x (out of 45) of the class work of each section should be in the interval [31.5, 33.75] ([70%, 75%] of the class work grade).				15% (60 pts)

✓ **Letter Grades:** The letter grades will follow a grading curve, which depends on the average of all students in the course.

- ✓ **Exams' Questions:** The questions of the exams are based on the examples, homework problems, and exercises in the textbook.

- ✓ **DO NOT BRING YOUR MOBILE, SMART WATCH OR ANY ELECTRONIC DEVICE IN THE EXAM HALL.**

- ✓ **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 for further action. Cheating in exams includes (but is not restricted to):
  - ➢ looking at the papers of other students
  - ➢ talking to other students
  - ➢ using mobiles, apple watches or any other electronic devices.

- ✓ **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 lecture 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 more than 20% unexcused absences (8 lectures) or 33% excused and unexcused absences (13 lectures)

  Note: The student will be warned **twice** by his instructor before he is assigned a DN grade.

- ✓ **The Usage of Mobiles in Class:** Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by the instructor.

- ✓ **Academic Integrity:** All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin.

Pacing Schedule

Week	Dates	Section	Topic	Suggested Homework
1	June 5- 9	1.1	Differential Equations & Math. Models **(Only Decay & Growth)**	2,6, 8,10,14,20,35,38
		1.2	Integrals as General and Particular Solutions	2, 4, 6, 8, 11, 17
		1.4	Separable Equations (**Without Applications)**	2, 8, 10, 24, 26, 34, 40
		1.5	Linear First Order Equations	2, 8, 10, 21, 28, 32
2	June 12-16	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, Inverses of Matrices, Determinants, Inverse & the Adjoint Matrix	**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	June 19-23	4.1	The Vector Space R^3	1, 4, 6, 8, 10, 16, 19, 20
		4.2	The Vector Space R^n & Subspaces	2, 8, 12, 14, 17, 26
		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
↑ Exam I: Thursday, June 23, 2022. [1.1- 3.6]				
4	June 26-30	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
		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
Hajj Holyday: July 3-14				
5	July 17-21	5.5	Nonhomogeneous Eq.: Undetermined coefficients	1, 4, 8, 16, 21, 27, 42, 44
			Nonhomogeneous Eq.: Variation of Parameters	48, 52, 57, 58, 62
		6.1	Introduction to Eigenvalues	3, 7, 14, 25, 31
		6.2	Diagonalization of Matrices	2, 10, 15, 18, 27
		6.3	Cayley-Hamilton Theorem **(ONLY)**	2, 15, 18, 22
↓Exam II: Sunday, July 24, 2022. [4.1- 5.5]				
6	July 24-28	7.1	First Order systems and Applications	1, 3, 8, 14, 20, 21
		7.2	Matrices and Linear Systems	1, 6, 12, 16, 20, 24
		7.3	The Eigenvalue Method for Linear Systems	1, 3, 9, 18, 25, 26
		7.5	Multiple Eigenvalue Solutions and Jordan Normal form	4, 9, 13, 16, 25, 28, 31, 38, 40, 43
7	July 31-Aug. 4	7.5	Continued	
		8.1	Matrix Exponentials & Linear Systems	2, 6, 10, 24, 26
		8.2	Nonhomogeneous Linear Systems **(Only Variation of Parameters Method)**	17, 19, 26, 32
8	Aug. 7-8		REVIEW and/or CATCHING UP	
Final Exam: Comprehensive.				