Department of Mathematics & Statistics, KFUPM

Math 570 Syllabus (Term 222)

Instructor: Abdulilah Kadri

akadri@kfupm.edu.sa

Course Title: Linear & Abstract Algebra and Number Theory (Math for Quantum Computing) **The Course Credit Hours:** 3-0-3

Course Description: Vector space, Eigenvalues, Linear Transformation. Matrix Representation and Operations, Integer Algorithms, Modular Arithmetic, Linear Congruent, Chinese Remainder Theorem, Group Theory, Finite Fields, Quadratic Residues, Probability Theory, Applications.

Prerequisite: Graduate Standing

Textbook: Algebra I, Alexey L. Gorodentsev, (Springer 2016)

Grading Policy:

1. **Assignments:** 10%
2. **Quizzes:** 15%
3. **Project Presentation:** 15%
4. **Midterm Exam:** 25%
5. **Final Exam:** 35%

Course Schedule:

Week	Topic	Material
1	Vector Spaces and Modules	6.1
	Bases and Dimension	6.2
2	Space of Linear Maps	6.3
	Matrix Algebras	8.2
3	Eigenvalues and Eigenvectors	15.2.4
4	Inner Product	10.1
5	Fields, Rings, and Abelian Groups	2.1
	The Ring of Integers	2.2
6	Rings of Residues	2.4
7	Direct Products of Commutative Groups and Rings	2.5
	Homomorphisms	2.6
8	Chinese Remainder Theorem	2.7
9	Finite Fields	3.6
10 – 11	Groups - Definitions and First Examples	12.1
	Cycles	12.2
12	Homomorphisms of Groups	12.4
13 – 14	Factorization of Groups	12.6
15	Discrete Probability Theory	Handout