**M-107 Vectors and Matrices (3+0) credit-hours.**

**Semester 1440-1441 H**

**Weekly Course Details**

**Calculus**

**WEEK 6**

**Chapter 10: Vectors and the Geometry of Space**   
**10.1** Vectors in the Plane   
**10.2** Vectors in Space   
**10.3** The Dot Product

**WEEK 7,8**

**10.4** The Cross Product   
**10.5** Lines and Planes in Space   
**10.6** Surfaces in Space

**WEEK 9**

**Chapter 11: Vector-Valued Functions**   
**11.1** Vector-Valued Functions   
**11.2** Limits, Derivatives

**11.**3Velocity, Acceleration.

**WEEK 10**

**11.4** Curvature , Unit Tangent Vector, Principal Normal Vector

**11.5** Tangential and Normal Components of Acceleration  
**WEEK 11**

**Chapter 12: Functions of Several Variables and Differentiation**   
**12.1** Functions of Several Variables   
**12.2** Limits and Continuity

**WEEK 12**   
**12.3** Partial Derivatives

**WEEK 13**  
**12.4** Tangent Planes and Linear Approximations, Increments and Differentials   
**12.5** The Chain Rule   
**12.6** The Gradient and Directional Derivatives

**WEEK 14**  
**12.7** Extrema of Functions of Several Variables   
**12.8** Constrained Optimization and Lagrange Multipliers

**Linear Algebra**

**WEEK 1**

**Chapter 1: System of Linear Equations**

* 1. System of linear equation
  2. Methods for solving system of linear equations
  3. Gauss Elimination Method

**WEEK 2**

* 1. Gauss Jordon Method
  2. Row Echlon form
  3. Reduced Row Echlon form
  4. Homogeneous system

**WEEK 3**

**Chapter 2: Matrices**

2.1 Matrix and Algebra of Matrices

2.2 Scalar Multiplication

2.3 Matrix Multiplication

2.4 Inverse of 2x2 matrix

2.5 Power of Matrix

2.6 Elementary Matrix

2.7 Methods of finding inverse of matrix

2.8 Solving Linear system by Inverse Matrix

**WEEK 4**

**Chapter 3: Determinant**

3.1 Determinant

3.2 By Direct Multiplication

3.3 By cofactor

3.4 By row operation

**WEEK 5**

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| 3.5 Properties of Determinantial function  3.6 Minor and cofactors, Inverse by cofactors  3.7 Crammer’ Rule |

**WEEK 15**

**Revision WEEK**

**Textbook(s)/ Additional Material**

**1. Linear Algebra by H. Anton ( any book on Linear Algebra from Library 512. 5   )**

**2. Calculus by Swokowski, Olinick and Pence, 6th Ed, PWS publishing Co. ( any book on Calculus from Library 515.1 5 )**

**Additional Material:**

**Lecture Notes on**

**Linear Algebra, Vector and Several Variables Calculus**

**by Khawaja Zafar Elahi**

**For announcement regarding course and for previous Exam papers, …**

**check web page**

**http://faculty.ksu.edu.sa/khawaja/default.aspx**