

# King Fahd University of Petroleum and Minerals

## Department of Mathematical Sciences

### SYLLABUS

Term 061

**Instructor:** Dr. Muhammad Yousuf

|                       |  |
|-----------------------|--|
| Course #:             | Math 302   |
| Title:                | Engineering Mathematics  |
| Textbook:             | Advanced Engineering Mathematics by P. O'Neil, 5 <sup>th</sup> edition (2003).   |
| Objectives:           | This course is designed to expose electrical and other engineering students to some basic ideas and notions of applied mathematics including linear algebra and complex numbers.   |
| Catalogue Description | Vector analysis including vector fields, gradient, divergence, curl, line and surface integrals, Gauss' and Stokes' theorems. Introduction to complex variables, vector spaces and subspaces. Linear independence, basis and dimension, solution of linear equations, orthogonality, eigenvalues and eigenvectors. |

### Grading Policy:

KFUPM attendance policy will be enforced.

Major 1: October 09, 2006

Major 2: November 20, 2006

Major 3: December 18, 2006

Final Exam: Jan. 20-30, 2007

Tuesday, November 7, Last day for dropping courses with "W" (Thru Internet)

Wednesday, November 29, Last day for dropping **all courses** with "W" (Thru Regist. Office)

Wednesday, January 10, withdrawal from **all courses** with grade of "WP/WF" (Thru Regist. Office)

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### Teaching Schedule and Office hours

|           | 8-8:50 | 9-9:50              | 10-10:50       | 11-11:50       | 12-12:50 | 1:10-2:00           | 4-4:50 |
|-----------|--------|---------------------|----------------|----------------|----------|---------------------|--------|
| Saturday  |        | Math 131<br>4 - 149 | Office<br>Hour | Office<br>Hour |          | Math 302<br>6 - 209 |        |
| Sunday    |        |                     |                |                |          |                     |        |
| Monday    |        | Math 131<br>4 - 149 | Office<br>Hour | Office<br>Hour |          | Math 302<br>6 - 209 |        |
| Tuesday   |        |                     |                |                |          |                     |        |
| Wednesday |        | Math 131<br>4 - 149 | Office<br>Hour | Office<br>Hour |          | Math 302<br>6 - 209 |        |

Also by appointment.

| Wk  | Date               | Sec.                 | Material  | Homework  |
|-----|--------------------|----------------------|---|---|
| 1   | Sept. 9-13         | 5.4<br>5.5           | The Vector Space $\mathbb{R}^n$<br>Linear Dependence and Independence   | 5*,8*,16*,17*,19*,21<br>6*,14*,17*,24,26                        |
| 2   | Sept. 16-20        | 6.5<br>6.7           | Solution of homogeneous Systems of Linear Equations<br>Non-homogeneous Systems of Linear Equations<br>Application: Inverse of a matrix (sec. 8.8) | 3*,17,18*,20<br>9*,13,15*                                       |
| 3   | Sept.23-27         | 8.1<br>8.2           | Eigenvalues and Eigenvectors<br>Diagonalization   | 6,16*,21*,23,26*<br>6,7*,18*                                    |
| 4   | Sept.30-<br>Oct. 4 | 8.3<br>11.1          | Orthogonal and Symmetric Matrices<br>Vector Functions of one Variable   | 1*,6*,12,14<br>6*,10,16,18*                                     |
| 5   | Oct. 7-11          | 11.4<br>11.5         | The Gradient Field<br>Divergence and Curl   | 6*,10,14*,20,22*,28*<br>4*,6,10,12*,19*                         |
| *** |                    | ***                  | <b>EID FITR BREAK</b>   | ***   |
| 6   | Oct.28-Nov. 1      | 12.1<br>12.2         | Line Integrals<br>Green's Theorem   | 6*,12,20,22*,27*,29<br>2*,4,12,14*,17*                          |
| 7   | Nov. 4-8           | 12.3<br>12.4         | Independence of Path and Potential Theory<br>Surface Integrals  | 4,8*,12,18*,20<br>4,8*,10*,16*                                  |
| 8   | Nov. 11-15         | 12.7<br>12.8         | Divergence Theorem of Gauss<br>The integral theorem of Stokes   | 6*,8,10,12,14*,16*<br>4,6*,14*,22*                              |
| 9   | Nov. 18-22         | 20.1<br>20.2         | Complex Number (Polar Form)<br>Loci and Sets of Points in the Complex Plane   | 2,10,22*,28*,34*<br>1,2,6*,7,16*,31*,36, 37*                    |
| 10  | Nov.25-29          | 21.1                 | Complex Functions, Limits and Continuity<br>Derivatives (Definition, Properties, Cauchy-Riemann Equations)  | 2,3,4*,5,6*,12*   |
| 11  | Dec.2-6            | 21.2<br>21.3<br>21.4 | Power Series<br>The Exponential and Trigonometric Functions<br>The Complex Logarithm  | 3*,9*,11*<br>2,4*,6,8,11,15*,19*, 23*<br>3,4*,6*,8*             |
| 12  | Dec.9- 13          | 21.5<br>22.1<br>22.2 | Powers<br>Curves in the plane (Quick Review)<br>Integration of Complex Function   | 2,6*,10,14*,20*,23*,24<br>1,3,7,9<br>2*,5*,8,20,24*             |
| 13  | Dec. 16-20         | 22.3<br>22.4         | The Cauchy Integral Theorem<br>Consequences of Cauchy's Theorem   | 2*,4*,5*,12,17*<br>4*, 6*,8,15*                                 |
| *** |                    | ***                  | <b>EID ADHA BREAK</b>   | ***   |
| 14  | Jan 6-10           | 23.2<br>24.1<br>24.2 | Laurent Series (Definitions and Examples)<br>Singularities<br>The Residue Theorem   | 1,3*,5*,6*,7,12<br>3,6*,10,16*,18,19*<br>1,2*,3*,5,9*,16*,24,25 |
| 15  | Jan 13-17          | 24.3<br>-5           | Evaluation of Real Integrals<br>Review  | 29,31*,33*,41.  |