King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
MATH 513 Mathematical Methods for Engineers

Semester I, 2015-2016 (152) Dr. F. D. Zaman

Text Book: Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edition (Chapman and Hall/CRC).

Additional Reading:

1. D.W.Trim, Applied Partial Differential Equations (International Thomson Publishing)
2. P.V.O'Neil, Advanced Engineering Mathematics (Thomson Brooks).

Objectives: This course is designed to introduce basic methods in Linear Algebra and Partial Differential Equations to students of engineering and science.

Outcomes: By the end of this course, the student should be able to

 Obtain Fourier series representations of commonly used functions Solve the Sturm Liouvilles Problems Know basic properties of the Laplace and Fourier Transforms and be able to find transforms of commonly used functions Know about basic linear partial differential equations (PDEs) Solve these PDEs using the Fourier Series and the Laplace and Fourier Transforms Understand and apply basic linear algebra

Bulletin Description:

> *Laplace transforms including the convolution theorem, error and gamma functions. The method of Frobenius for series solutions to differential equations. Fourier series, Fourier-Bessel series and boundary value problems, Sturm-Liouville theory. Partial differential equations: separation of variables and Laplace transforms and Fourier integrals methods. The heat equation. Laplace equation, and wave equation. Eigenvalue problems for matrices, diagonalization.*

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Evaluation Scheme:

Major # 1 25 % Major # 2 25 % Assignments/Attendance 15 % Final 35 %

Week	Chapter	Topic	HW
1		Partial Differential Equations of Mathematical Physics – Classification and commonly used PDEs	-
2	4.1-4.2	Fourier Series	Page 190: 3, 6, 14 Page 198-199: 1, 3
3	4.3-4.4	Fourier Series Contd.	Page 203-204: 2, 8, 10 Page 208: 1, 3
4	5.1	Fourier Transforms	Page 247-249: 2, 6, 8, 10
5	5.2-5.3	Fourier Transforms	Page 265: 3
6	6.1-6.2	Laplace Transforms	Page 296:2,3 Page 302: 1, 3, 9, 10
7	6.3-6.4	Laplace Transforms	Page 309-311: 5, 12, 17, 23, 27, 39, 41 Page 315: 4
8	6.5-6.7	Laplace Transform, Properties and Related Results	Page 327:5, 12 Page 331: 2,4
9	9.1-9.2	The Sturm Liouville Problem	Page 441-442: 2, 8, 11,12 Page 445: 2
10	9.4-9.5	Legendre and Bessel Equations	Page 466: 1, 5, 7 Page 485-487: 2,4, 13, 16
11		Boundary value of Problems of PDEs: Separation of Varables	To be announced
12		Transform Methods	To be announced
13	-	PDEs by Transform methods	To be announced
14	15.115.4	Matrices, Gauss Jordan Elimination method Determinants and Cramer's Rule	Page 889: 3, 5, 8
15	15.5	Eigenvalue Problems and Diagonalization of Matrices	Page 897: 4, 6, 8
16	15.6	First-Order Systems & Applications Matrices & Linear Systems	Page 905: 2, 8, 17