King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

MATH 514 Advanced Mathematical Methods

Semester I, 2015-2016 (151)

Dr. M. Yousuf

Text Book: James P. Keener, Principles of Applied Mathematics (Addison Wesley Publishing Company)

Additional Reading: Brian Davis: Integral transforms and their applications, Springer,2002.

Objectives: This course is designed to introduce advanced mathematical methods to graduate students in Mathematics, Science and Engineering.

Bulletin Description: Integral transforms; Fourier, Laplace, Hankel and Mellin transforms and their applications. Singular integral equations. Wiener Hopf technique. Applications of conformal mapping. Introduction to asymptotic expansions.

Week	*Date*	Chapter	Topic
1 - 2	Aug 23 - Sep 03	6.1, 6.2	Review of Complex integration. Branch points and integration along branch cuts.
3-4	Sept 06 – 17	7.2	Fourier and Laplace transforms, analyticity of transforms and inversion.
Id al-Adha Vacations: Sep 18-Sept 28, 2015			
5-6	Sep 29– Oct 08	Additional material	Applications of Fourier and Laplace transforms.
7	Oct 11-15	7.3	Hankel transform; properties and applications
8	Oct. 18-22	Additional material	Mellin transform; properties and applications
9	Oct. 25-29	3.1, class notes	Singular integral equations
10	Nov. 1-5	Additional material	Wiener-Hopf method for singular integral equations
11	Nov. 8-12	Additional material-	Wiener-Hopf method for mixed boundary value problems
12	Nov. 15-19	6.3	Conformal mappings; applications.
13	Nov 22 – 26	10.1	Little o and big O symbols; asymptotic functions
14	Nov 29 - Dec 3	10.2, 10.3	Asymptotic sequences and series. Asymptotic approximation of integrals.
15	Dec. 6 – 10		Catching up and Review
16	Dec. 13 – 14		Catching up and Review

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Evaluation Scheme:

Midterm Exam	40 %
Assignments/Attendance	15 %
Final	45 %