

King Fahd University of Petroleum and Minerals  
 Department of Mathematics & Statistics  
**MATH 514 Advanced Mathematical Methods**  
 Semester I, 2013-2014 (131)  
 Dr. F. D. Zaman

**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	Sept. 01– 12	6.1, 6.2	Review of Complex integration. Branch points and integration along branch cuts.
3-4	Sept.15–26	7.2	Fourier and Laplace transforms, analyticity of transforms and inversion.
Monday, September 23, 2013 National Day			
5-6	Sept.29– Oct.09	Additional material	Applications of Fourier and Laplace transforms.
Thursday Oct.10 to Sunday Oct.20, 2013 Eid Al-Adha Break			
7	Oct.21-24	7.3	Hankel transform; properties and applications
8	Oct. 27 – 31	Additional material	Mellin transform; properties and applications
9	Nov. 03-07	3.1, class notes	Singular integral equations
10	Nov.10 – 14	Additional material	Wiener-Hopf method for singular integral equations
11	Nov.27 -21	Additional material-	Wiener-Hopf method for mixed boundary value problems
12	Nov. 24 – 28	6.3	Conformal mappings; applications.
13	Dec. 01 – 05	10.1	Little o and big O symbols; asymptotic functions
14-15	Dec.08–19	10.2, 10.3	Asymptotic sequences and series. Asymptotic approximation of integrals.
16*	Dec. 22 – 24*		Catching up and Review
*December 24 is Normal Thursday and is Last day of classes			

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Evaluation Scheme

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