

King Fahd University of Petroleum and Minerals  
 Department of Mathematics & Statistics  
**MATH 514 Advanced Mathematical Methods**  
**Semester II, 2016-2017 (162)**  
**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	Feb. 05-16	6.1, 6.2	Review of Complex integration. Branch points and integration along branch cuts.
3-4	Feb.19-Mar 02	7.2	Fourier and Laplace transforms, analyticity of transforms and inversion.
5-6	March 05-16	Additional material	Applications of Fourier and Laplace transforms.
7	March 19- 23	7.3	Hankel transform; properties and applications
8	March 26-30	Additional material	Mellin transform; properties and applications
April 2-6, Midterm Break			
9	April 9- 13	3.1, class notes	Singular integral equations
10	April 16-20	Additional material	Wiener-Hopf method for singular integral equations
11	April 23- 27	Additional material-	Wiener-Hopf method for mixed boundary value problems
12	April 30- May 4	6.3	Conformal mappings; applications.
13	May 7-11	10.1	Little o and big O symbols; asymptotic functions
14-15	May 14- 25	10.2, 10.3	Asymptotic sequences and series. Asymptotic approximation of integrals.

Office: 5 - 430 Phone 2189

Email: [fzaman@kfupm.edu.sa](mailto:fzaman@kfupm.edu.sa)

Evaluation Scheme

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