

King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
SYLLABUS

Semester I: 2016-2017(161)

Coordinator: Dr. Muhammad Yousuf

Course #: MATH 301

Title: Methods of Applied Mathematics

Textbook: Advanced Engineering Mathematics by Zill and Wright (Fifth Edition)

Week	Date	Sec.	Topics	Suggested Homework Problems
1	Sep 18 – 21	9.1 9.5	Vector Functions The Directional Derivative	1,12,16,17,21,26,33, 41 2,7,9,14,17,21,23,32,29
2	Sep 25 –29	9.7 9.8	Curl and Divergence Line Integrals	2,6,10,14,17,22,27 2,6,8,11,16,19,24,28,33
3	Oct 02 –06	9.9 9.12	Independence of the Path Green's Theorem	1,10,15,18,21,26 2,4,6,9,18,23,25
4	Oct 09 – 13	9.13 9.14	Surface Integrals Stokes' Theorem	2,5,10,13,18,22,25,33 1,3,6,8,13,17
5	Oct 16 – 20	9.16 4.1	Divergence Theorem Definition of the Laplace transform	2,4,7,11,14 1,5,14,26,30,37,43
Major Exam I: Material 9.1 – 9.16				
6	Oct 23 – 27	4.2 4.3	Inverse Transform, Transforms of Derivatives Translation Theorems	2,10,19,22,24,32,35 2,8,13,20,24,31,37,48,55,63
7	Oct 30 – Nov 03	4.4 4.5	Additional Operational Properties The Dirac Delta Function	1,10,16,22,27,31,38,46 1,4,8,12
8	Nov 06–10	12.1 12.2	Orthogonal Functions Fourier Series	2,6,11,13 1,6,12,17,20
Midterm Vacation: Nov 13 – 17, 2017				
9	Nov 20– 24	12.3	Fourier Cosine and Sine Series	1,8,12,16,25,35,38
10	Nov 27– Dec 01	12.5	Sturm-Liouville Theorem	2,4,6,12
Major Exam II: Material 4.1 -12.5				
11	Dec 04–08	12.6 13.1	Bessel and Legendre Series Separable Partial Differential Equations	2,4,6,8,15,20 2,8,12,16,22,26,27
12	Dec 11–15	13.3 13.4	Heat Equation Wave Equation	2,3,6 1,6,9,16,23
13	Dec 18– 22	13.5 14.2	Laplace's Equation Problems in Cylindrical Coordinates	2,4,7,10,14 2,4,9,12
14	Dec 25–29	14.3 15.2	Problems in Spherical Coordinates Applications of the Laplace Transform	2,5,11,12 2,4, 10,14,18,24
15	Jan 01 – 05	15.3 15.4	Fourier Integral Fourier Transforms	1,4,10 1,6,10,12,16
16	Jan 08		Review and Catch up	
Final Exam : Wednesday, Jan 11, 2017, 12:30 – 03:30 PM				

Grading Policy:

Exam I	25%	Final Exam	35%
Exam II	25%	Class work	15%

Attendance: Attendance is compulsory. KFUPM policy with respect to attendance will be strictly enforced. Any student accumulating **9 unexcused absences** will be awarded DN Grade in the course.

Note: Date and location of the Midterm exams will be announced later.

Math 301 Methods of Applied Mathematics

Upon completion of this course, students will be able to:

1. Recognize the vector fields, find their curl and divergence, and test whether they are conservative.
2. Evaluate the line integral along plane or space curves and the surface integral over surfaces in 3-space.
3. Use Green's, Stokes' and Divergence theorems to relate and evaluate different types of integral.
4. Evaluate the Laplace transform and inverse Laplace transform of a given function.
5. Apply the Laplace transform, inverse Laplace transform, and their operational properties to solve linear initial-value and boundary-value problems.
6. Find the Fourier series, the Fourier cosine and sine series, and the Bessel and Legendre series of a given function.
7. Find the eigenvalues and eigenfunctions for a given Sturm-Liouville boundary-value problem and state their orthogonality relation.
8. Solve separable partial differential equations.
9. Solve boundary-value problems involving the wave, heat and Laplace equations in various coordinate systems.
10. Evaluate the Fourier integral and the Fourier cosine and sine integrals of a given function.
11. Use the Fourier transform, inverse Fourier transform, and their operational properties to solve linear boundary-value problems