King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 333: Syllabus – Term 181

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Course Code:	MATH 333
Title:	Methods of Applied Mathematics
Textbook:	**Advanced Engineering Mathematics** (Fifth Edition) by D.G. Zill and W.S. Wright, International Edition.
Catalogue Description	Special functions. Bessel's functions and Legendre polynomials. Vector analysis including vector fields, divergence, curl, line and surface integrals, Green's, Gauss' and Stokes' theorems. Sturm - Liouville theory. Laplace transforms. Fourier series and transforms. Introduction to partial differential equations and boundary value problems in rectangular, cylindrical and spherical coordinates.

Grading Policy:

Major Exam I: 25% (100 points)	Material: **9.1-9.16** **Wednesday, October 10, 6:00-8:00pm & Venue: B#57**
Major Exam II: 25% (100 points)	Material: **4.1-12.5** **Wednesday, November 14, 6:00-8:00pm & Venue: B#57**
Final Exam: 35% (140 points)	Comprehensive. **December 16, Sunday, 7-30am**
Class Work: 15% (60 points)	Quizzes +HW+ Attendance

Attendance: compulsory. KFUPM policy regarding attendance will be strictly enforced.
A **DN** grade will be awarded to any student who accumulates 9 unexcused absences.

Learning Outcomes:

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

1. Recognize the vector fields, their curl and divergence, and test whether they are conservative.
2. Evaluate line integrals along planes or space curves and the surface integrals over surfaces in three dimensional space.
3. Use Green's, Stokes' and Divergence theorems to relate and evaluate different types of integrals.
4. Evaluate the Laplace transform and inverse Laplace transform of some functions.
5. Apply 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 some functions.

7. Find the eigenvalues and eigenfunctions for some Sturm-Liouville boundary-value problems and state their orthogonality relations.
8. Solve partial differential equations involving the wave, heat and Laplace equations in various coordinate systems using the separation of variables technique.
9. Evaluate Laplace transform, inverse Laplace transform, and their operational properties to solve some partial differential equations.
10. Use the Fourier transform, inverse Fourier transform, and their operational properties to solve partial differential equations.

Week	Date	Sec.	Topics	Suggested Homework Problems
1	Sept 02–07	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	Sept 09–13	9.7 9.8	Curl and Divergence Line Integrals	2,6,10,14,1722,27 2,6,8,11,16,19,24,28,33
3	Sept 16–20	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	Sept24–27	9.13 9.14	Surface Integrals Stokes' Theorem	2,5,10,13,18,22,25,33 1,3,6,8,13,17
	September 23, National Day Holiday : September 29, Normal Sunday Classes			
5	Sept 29 – Oct 04	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: Oct. 10, 2018 (B#57, 6.00-8.00PM**), Material 9.1 – 9.16**,			
6	Oct 07 – 11	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 14 – 18	4.4 4.5	Additional Operational Properties The Dirac Delta Function	1,10,16,22,27,31,38,46 1,4,8,12
8	Oct 21 – 25	12.1 12.2	Orthogonal Functions Fourier Series	2,6,11,13 2,4,6,12
9	Oct 28 – Nov 01	12.3 12.5	Fourier Cosine and Sine Series Sturm-Liouville Theorem	1,6,12,17,20 1,8,12,16,25,35,38
10	Nov 04-08	12.6	Bessel and Legendre Series	2,4,6,8,15,20
	Major Exam II: Nov. 14, 2018. (B#57, 6.00-8.00PM**), Material 4.1 -12.5**			
11	Nov 11–15	13.1 13.3	Separable Partial Differential Equations Heat Equation	2,8,12,16,22,26,27 2,3,6
12	Nov 18-22	13.4 13.5	Wave Equation Lap lace's Equation	1,6,9,16,23 2,4,7,10,14

13	Nov. 25-29	14.2 14.3	Problems in Cylindrical Coordinates Problems in Spherical Coordinates	2,4,9,12 2,5,11,12
14	Dec 02-06	15.2	Applications of the Laplace Transform	2,4, 10,14,18,24
15	Dec 09-13	15.4	Fourier Transforms	1,6,10 , 12, 16
Final Exam : Sunday, December 16, 2018, 07:30AM				