King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
SYLLABUS
Summer Term: 2016-2017(163)
Coordinator: Prof. Bilal Chanane

Course #: MATH 301
Title: Methods of Applied Mathematics
Textbook: Advanced Engineering Mathematics by Zill and Wright (Fifth Edition)
Course 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.
Prerequisite: MATH 202 or MATH 260

Week	Date	Sections	Topics	Suggested Homework Problems
1	July 9-13	9.1 9.5 9.7 9.8 9.9	Vector Functions The Directional Derivative Curl and Divergence Line Integral Independence of the Path	1,12,16,17,21,26,33, 41 2,7,9,14,17,21,23,32,29 2,6,10,14,1722,27 2,6,8,11,16,19,24,28,33 1,10,15,18,21,26
2	**July 15*-20**	9.12 9.13 9.14 9.16	Green's Theorem Surface Integrals Stokes' Theorem Divergence Theorem	2,4,6,9,18,23,25 2,5,10,13,18,22,25,33 1,3,6,8,13,17 2,4,7,11,14
EXAM I: Tuesday, Jul. 25th (19:00 – 21:00) 9.1-9.16				
3	July 23-27	4.1 4.2 4.3 4.4 4.5	Definition of the Laplace transform Inverse Transform, Transforms of Derivatives Translation Theorems Additional Operational Properties The Dirac Delta Function	1,5,14,26,30,37,43 2,10,19,22,24,32,35 2,8,13,20,24,31,37,48,55,63 1,10,16,22,27,31,38,46 1,4,8,12
EXAM II: Wednesday, Aug. 9th (19:00 – 21:00) 4.1-12.5				
4	July 30- August 3	12.1 12.5 12.2 12,3 12.6	Orthogonal Functions Sturm-Liouville Theorem Fourier Series Fourier Cosine and Sine Series Bessel and Legendre Series	2,6,11,13 2,4,6,12 1,6,12,17,20 1,8,12,16,25,35,38 2,4,6,8,15,20
5	August 6-10	13.1 13.3 13.4 13.5 14.2	Separable Partial Differential Equations Heat Equation Wave Equation Lap lace's Equation Problems in Cylindrical Coordinates	2,8,12,16,22,26,27 2,3,6 1,6,9,16,23 2,4,7,10,14 2,4,9,12
6	August 13-17	14.3 15.2 15.3 15.4	Problems in Spherical Coordinates Applications of the Laplace Transform Fourier Integral Fourier Transforms	2,5,11,12 2,4, 10,14,18,24 1,4,10 1,6,10,12,16
7	August 20		Catch up and Review	

***Normal Monday class**

Grading Policy:

Exam I	**25 % (100 pts)**	Tuesday, Jul. 25th (19:00 – 21:00) 9.1-9.16
Exam II	**25 % (100 pts)**	Wednesday, Aug. 9th (19:00 – 21:00) 4.1-12.5
Final Exam	**35 % (140 pts)**	**Tuesday, Aug. 22nd (12:30-15:30) Comprehensive**

Class work	**15 % (60 pts)**	**Quizzes+HW+Attendance**

Attendance:

- Attendance is compulsory. KFUPM policy with respect to attendance will be strictly enforced.
- Any student accumulating **6 unexcused absences** will be awarded DN Grade in the course.
- class duration for this term (163) IS 70 minutes and not 50 minutes like the other terms !

Learning Outcomes:

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

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Office Hours:
Monday & Wednesday: 12:30-13:30
Sunday, Tuesday & Thursday: 8:45-9:30
… and by appointment.