

King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Syllabus of Math 333-Term 202

Coordinator: Dr. Nasser-eddine Tatar

Course: MATH 333

Title: Methods of Applied Mathematics I

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

Course Objectives: The objective of the course is to introduce students to calculus of vector functions, Laplace and Fourier transforms, Fourier series and partial differential equations.

Catalog 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.

Prerequisites: MATH 201, MATH 202 or MATH 208

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

1. Calculate the line integral along plane or space curves and the surface integral over surfaces in 3-space.
2. Compute different types of integrals using Green's, Stokes' and Divergence theorems
3. Evaluate Laplace transform, inverse Laplace transform, and Fourier integral of a given function.
4. Find Fourier series, Fourier cosine/sine series, Bessel and Legendre series of a given function.
5. Evaluate the eigenvalues and eigenfunctions for a given Sturm-Liouville boundary-value problem.
6. Solve boundary-value problems for wave, heat, and Laplace equations in various coordinate systems by variable separable method.
7. Use Laplace, inverse Laplace, Fourier, and inverse Fourier transforms to solve linear initial and boundary-value problems.

Weekly Distribution of the Material

Week	Date	Sec.	Topics	Homework Problems
1	Jan. 17-21	9.1	Vector Functions	1,12,16,17,21,26,33, 41
2	Jan. 24-28	9.5 9.7	Directional Derivative Curl and Divergence	2,7,9,14,17,21,23,32,29 2,6,10,14,17,22,27
3	Jan. 31-Feb. 04	9.8 9.9	Line Integrals Independence of the Path	2,6,8,11,16,19,24,28,33 1,10,15,18,21,26
4	Feb. 7-11	9.12 9.13	Green's Theorem Surface Integrals	2,4,6,9,18,23,25 2,5,10,13,18,22,25,33
5	Feb. 14-18	9.14	Stokes' Theorem	1,3,6,8,13,17

		9.16	Divergence Theorem	2,4,7,11,14
6	Feb. 21-25	4.1 4.2	Definition of the Laplace transform The Inverse Transform and Transforms of Derivatives	1,5,14,26,30,37,43 2,10,19,22,24,32,35
7	Feb 28-Mar 04	4.3 4.4	Translation Theorems Additional Operational Properties	2,8,13,20,24,31,37,48,55,63 1,10,16,22,27,31,38,46
8	Mar. 07-11	4.5 12.1	The Dirac Delta Function Orthogonal Functions	1,4,8,12 2,6,11,13
9	Mar. 14-18	12.2 12.3	Fourier Series Fourier Cosine and Sine Series	2,4,6,12 1,6,12,17,20
10	Mar. 21-25	12.5 12.6	Sturm-Liouville Theorem Bessel and Legendre Series	1,3,7,8,11,12 2,4,6,8,15,16
11	Mar 28-Apr 01	12.6 13.1	Bessel and Legendre Series (Continue) Separable Partial Differential Equations	2,4,6,8,15,16 2,8,12,16,22,26,27
12	Apr. 04-08	13.3 13.4	Heat Equation Wave Equation	2,3,6 1,6,9,16,23
13	Apr. 11-15	13.5 14.2	Laplace's Equation Problems in Cylindrical Coordinates	2,4,7,10,14 2,4,9,12
14	Apr. 18-22	14.3 15.2	Problems in Spherical Coordinates Applications of the Laplace Transform	2,5,11,12 2,4, 10,14,18,24
15	Apr. 25-29	15.3 15.4	Fourier Integrals Fourier Transforms	1,4,10 1,6,10,12,16

Grading Policy:

Type of Assessment	Date	Time	Percentage	Material
Quizzes	Instructor's choice	Instructor's choice	15%	Instructor's choice
Homework	See Syllabus		15%	See Syllabus
Midterm	Will be announced later	Will be announced later	30%	Will be fixed later
Final	Will be announced later	Will be announced later	40%	Comprehensive
Total			100	

Course Passing Grade: A student must score at least 50% to pass.

Upgrade Policy: Upgrading is made automatically if a student is 1 or 2 points short of the next higher grade. If he is 3 points short, the final exam score alone, when scaled out of 300, must lie in the category of the next higher score for an upgrade to be applied. No other circumstances are subject to upgrading.

Exam Questions: The questions of the exams are based on the examples, homework problems, and exercises in the textbook.

Misconduct in Exams: Cheating or attempting to cheat will result in a grade of **F** in the course, along with reporting the incident to the higher university administration. Cheating in exams includes (but is not limited to) receiving help from anyone or any other outside source, disabling webcams, and unauthorized use of books, course notes, calculators, phones, or websites.

Missing an Exam: No make-up quiz will be given under any circumstances. In case a student misses a quiz for a legitimate approved reason (such as medical emergencies), his score for that quiz will be determined based on his performance in the remaining quizzes. If a student misses the final exam for a legitimate approved reason, a make-up final exam will be given.