King Fahd University of Petroleum and Minerals
Department of Mathematics
SYLLABUS
2024-2025 (241)

Course #:   **Math 513 (3-0-3)**
Title: Mathematical Methods for Engineers
Textbook: Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 4th Edition
References   Advanced Engineering Mathematics by Zill and Wright.

Instructor: Zaid Sawlan
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Course Description: Laplace transforms including the convolution theorem. Error and gamma functions. The method of Frobenius for series solutions to differential equations. Fourier series and Fourier-Bessel series. Boundary value problems. Sturm-Liouville theory. Partial differential equations: Separation of variables, Laplace transforms, and Fourier integrals methods. The heat equation, Laplace equation, and wave equation. Eigenvalue problems for matrices. Diagonalization.

Prerequisite: Graduate Standing. (Not open to Mathematics majors. Cannot be taken for credit with MATH 333.)

Learning Outcomes: After completion of the course, the student should be able to:

1. Understand and apply basic linear algebra.
2. Obtain Fourier series representations of commonly used functions.
3. Solve Sturm Liouville Problems.
4. Solve Wave, Heat, and Laplace equations using separation of variables method.
5. Solve these PDEs using Fourier Series, Laplace Transform, and Fourier Transforms

Weekly Plan

Week	Chapters	Material
1-2	1-3	Review of Ordinary Differential Equations and Linear Algebra
3-4	5	Fourier Series
5-6	6	The Sturm-Liouville Problems
7-8	7	The Wave Equation
9-10	8	The Heat Equation
11-12	9	The Laplace Equation
13	11	The Fourier Transform
14-15	12	The Laplace Transform

The Course Grading Policy

Homework (written)	20% (80 points)	▪ The project consists of a report and a presentation or a poster.
Quizzes	15% (60 points)	
Midterm (written) **Date: Oct 17, 2024**	20% (80 points)	▪ The exams questions are based on the examples, homework problems, and exercises of the Textbook.
Project (written)	20% (80 points)	
Final Exam (comprehensive & written) **Date of Final Exam: TBA**	25% (100 points)	

Midterm and Final Exams Formula Sheets: Both exams will have a formula sheet when necessary that will aid students during the exams. Copies of the Formula Sheets will be available in the Blackboard for students to reference while studying. You should not print the Formula Sheet and bring the hard copy with you during the exam; instead, a hard copy of the Formula Sheet will be provided to you together with the exam copy on the exam day.

Homework Guidelines:
- Late homework assignment submission will not be accepted.
- Electronic submission of any homework assignment through email is not allowed.
- The homework includes exercises on the theoretical topics taught in classes in addition to MATLAB assignments.
- You should properly cite any outside sources you used.
- You are expected to express your answers clearly with solid justifications.

Project Guidelines:
- For the project, students should work in groups; with the maximum number of students in each group is 6 students.
- Late project report submission will not be accepted.
- Electronic submission of the project report through email is not allowed.
- The project must include a numerical part and motived by real application.

Cheating in Exams: Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a DN grade in the course along with reporting the incident to the higher university administration. Cheating in exams includes, but not limited to:
- Looking at the papers of other students.
- Talking with other students.
- Using mobiles or any other electronic devices including smart watches.

Missing an Exam:

- In case a student misses any of these exams for a legitimate reason, he/she must bring an official excuse from the Student Affairs no later than a week after the date of the Exam to have a make-up exam. Otherwise, he/she will receive a zero grade for the missed exam.

Attendance: Students must adhere to the attendance policy of KFUPM.

- If a student misses a class, he/she is responsible for any announcement made in that class.
- A student is considered absent if not attending the class 10 minutes after the class start time; he/she is permitted to attend the remainder of the class session.
- A student, who has a legitimate excuse for an absence, must present an official excuse from the Student Affairs no later than a week before the date of the Final Exam; no excuses shall be accepted after that date.
- A DN grade will be awarded to any student who accumulates more than 9 unexcused absences in classes.
  - 20 excused and unexcused absences in classes.
- A DN grade will be assigned to the eligible student after being warned twice by his/her instructor.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Graduate Bulletin on the Registrar Webpage.