King Fahd University of Petroleum and Minerals

Department of Mathematics and Statistics

SYLLABUS

T251

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.

The 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.

The Course Prerequisite: Graduate Standing. (Not open to mathematics majors. Students cannot receive credit for both MATH 333 and MATH 513.)

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

Week	Chapters	Material
1-2	3	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

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The Course Grading Policy

Homework	15% (60 points)	▪ The exams questions are based on the examples, homework problems, and exercises of the Textbook.
Exam I **Date: TBA**	25% (100 points)	
Exam II **Date: TBA**	25% (100 points)	
Final Exam (comprehensive & written) **Date of Final Exam: TBA**	35% (140 points)	
Course Passing Grade	A student must score at least 50% (200/400) to pass the course.	

Midterm and Final Exams Formula Sheets: Both exams will have a formula sheet when necessary that will aid students during the exams. 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.
- You should properly cite any outside sources you used.
- You are expected to express your answers clearly with solid justifications. Stating the final answer to a question without any justifications shall attract a zero mark.
- Box your final answer(s) and important intermediate results.

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 a Classwork Assignment, or an Exam:

- Classwork Assignments: No make-up assessment will be given under any circumstances. If a student miss any of the classwork assignments for a legitimate reason (such as medical emergencies), he/she must bring an official excuse from the Student Affairs no later than a week before the date of the Final Exam. In this case the student grade for the classwork assignment will be the average of all other classwork assignments grades he/she received in the course during the term. Otherwise, he/she will receive a zero grade for the missed assignment.
- Midterm and Final Exams: 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.

Major and Final Exams Admission Requirements:

- All students must bring and show their identity cards (KFUPM/National/Iqama) before entering the exam hall.
- Students are not allowed to carry mobile phones, smart watches, or electronic devices to the exam halls.
- Students must take the exam in the places assigned to them.

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.

Usage of Calculators: Calculators are allowed in all exams.

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

Tips on How to Enhance Your Problem-Solving Skills:

- Make sure you understand the concepts and techniques of each section.
- Take notes during classes and study your notes, textbook, and my lecture slides before our next class.
- Do all the homework assignments on time.
- Try always to solve the problems on your own first before reading the solution or asking for help.
- Practice more problems than those given in the homework assignments.
- If you find it difficult to solve a certain type of problems, you should try more problems of that type.
- Try to make good use of my office hours.
- Solve old exams as part of your preparation for the Midterm and Final Exams.
- Last, but not least, consult me whenever you feel you need help understanding a concept or solving a problem.