DAVIS UNIVERSITY

COURSE SYLLABUS

MTH107: INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS

SUMMER QUARTER 2024

QUARTER: SUMMER QUARTER 2024

COURSE SYLLABUS FOR: MTH107 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS

CREDIT HOURS: 4 CREDIT

INSTRUCTOR:

INSTRUCTOR EMAIL:

INSTRUCTOR OFFICE HOURS:

COURSE DESCRIPTION: Introduction to Fourier series and method of separation of variables; d'Alember's formula. Maximum principles, energy integrals and uniqueness; the wave equation, heat equation and Laplace's equation; Sturn-Liouville problems and eigenfunction expansions.

TEXT: *A First Course in Partial Differential Equations, J. Robert Buchanan and Zhoude Shao, World Scientific Publishing Company, Hackensack, ISBN-13: 978-9813226432.*

LATE WORK POLICY: All students are expected to submit homework assignments on time. No late homework will be accepted and the student will receive a "0" (zero) for the homework assignment. Should the student refuse to complete the assigned work for the class, it could result in the student failing the class. All work assigned is expected to be completed on the date assigned. The instructor reserves the right to alter the schedule as necessary.

PLAGIARISM AND COPYRIGHT INFRINGEMENT POLICY: Work that is found to be plagiarized receives a grade of zero and often causes a student to fail a class. Documentation of plagiarism is added to the student's academic file as a violation of accepted student conduct and

is subject to disciplinary action. Plagiarism is the use of another person's exact words, or their ideas written in the student's words without giving the original author credit.

Plagiarism can result from any of the following:

- Quote material directly without using quotation marks.
- Paraphrase the original so that many of the phrases are the same as the original. A good rule is no more than 3 or 4 words in a row should be the same as the original.
- Copy the original sentence pattern, substitution synonyms for key words.
- Neglect to indicate the source of the original material.

ASSESSMENTS:

Content	
Midterm exam	30%
Homework	10%
Quizzes	30%
Final exam	30%
Total	100%

COURSE GRADE: **A = 93%-100%**

B = 85%-92%

C = 77%-84%

D = 70%-76%

F = below 70%

TENTATIVE CLASS SCHEDULE:

(Subject to change)

Week: Date	Content Covered	Assignments & Assessment Due
Week 1:	Introduction 2.1 First-Order Linear Equations 2.2 First-Order Quasilinear Equations 3.1 Periodic Functions 3.2 The Trigonometric System and Orthogonality 3.3 Euler-Fourier Formulas and Fourier Series 3.4 Even and Odd Functions 3.5 Even or Odd Extension of Functions 3.6 Convergence Theorem	
Week 2:	3.7 The Gibbs Phenomenon and Uniform Convergence 3.8 Differentiation and Integration of Fourier Series 3.9 Mean Square Approximation and Parseval's Identity. 3.10 Complex Form of the Fourier Series 3.11 Proofs of Two Theoretical Results 4.1 Homogeneous Boundary Value Problems on Bounded Intervals 4.2 Nonhomogeneous Boundary Value Problems 4.3 A Maximum Principle and Uniqueness of Solutions	
Week 3:	4.4 The Heat Equation on Unbounded Intervals 4.5 The Heat Equation on a Rectangular Domain 5.1 Wave Equation with Homogeneous Boundary Conditions 5.2 d'Alembert's Approach 5.3 Solving the Wave Equation - Revisited 5.4 Nonhomogeneous Cases 5.5 The Energy Integral and Uniqueness of Solutions	Midterm Exam-Friday

Week 4:	6.1 Boundary Value Problems of Laplace's Equation 6.2 Dirichlet Problems on Rectangles 6.3 Dirichlet Problems on Disks 6.4 Dirichlet Problems on Domains Related to Disks 6.5 Neumann Problems on Rectangles 6.6 Neumann Problems on Disks 6.7 Mixed Boundary Conditions on Rectangles 6.8 Poison's Formula and Mean Value Property. 6.9 Maximum Principle and Uniqueness	
Week 5:	7.1Two-Point Boundary Value Problems of Second-Order Differential Equations 7.2 Properties of Eigenvalues and Eigenfunctions 7.3 Zeros of Eigenfunctions 7.4 Generalized Fourier Series 7.5 Estimating Eigenvalues and the Rayleigh Quotient 7.6 Existence of Eigenfunctions and Eigenvalues	Final Exam-Friday