MATH 4230: Elementary Partial Differential Equations

2022 Winter Session	
Total Class Sessions: 25	Instructor: Staff
Class Sessions Per Week: 6	Classroom: TBA
Total Weeks: 4	Office Hours: TBA
Class Session Length (Minutes): 145	Language: English
Credit Hours: 4	

Course Description:

In mathematics, a partial differential equation (PDE) is a differential equation that contains unknown multivariable functions and their partial derivatives. This course introduces the topic of partial differential equations for students in mathematics, engineering, and the sciences. Four main topics will be included in the course: the physical origins of partial differential equations, partial differential equations on unbounded domains, orthogonal expansions, partial differential equations on bounded domains. Focus will be on three generic types of partial differential equations: the wave equation, the heat equation, the Laplace equation. Also, students will be introduced with different behavior of the solutions.

Course Materials:

J. David Logan, Applied Partial Differential Equations, 3rd edition, 2015.

Course Assignments:

Attendance:
Attendance at all class meetings is required. You should notify the instructor as far in advance as possible of any class meeting for which you need to be absent, late, or leave early because of illness or other serious extenuating circumstances. You will be evaluated on your participation in class activities. Your participation also includes coming to class prepared to discuss the readings and related material and with all completed assignments due.
Quizzes:
There will be six quizzes administered through the whole semester. Quizzes will always be completed in the beginning of class. The quiz problems will be similar to textbook topics and examples on slides. There will be no make-up quizzes. The lowest one will be dropped.
Exams: Midterm Exams   There will be two midterm exams in this course. The midterm exam will be based on concepts covered in class. It will be in-class, close-book and non-cumulative.   Final Exam

The final will be cumulative and close-book. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

Course Assessment:

Attendance	10%
Quizzes	20%
Midterm Exams 1	20%
Midterm Exams 2	20%
Final Exam	30%
Total	**100%**

Grading Scale (percentage):

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
98-100	93-97	90-92	88-89	83-87	80-82	78-79	73-77	70-72	68-69	63-67	60-62	<60

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Chengdu University of Technology's Academic Conduct Code. Any work suspected of violating the standards of the Academic Conduct Code will be reported to the Dean's Office. Penalties for violating the Academic Conduct Code may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the Academic Conduct Code.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.

Course Schedule:

Week	Topics	Assignments

Week 1 (Class 1~6)	• Introduction to the course
	• The Physical Origins of Partial Differential Equations
	    PDE Models
	    Conservation Laws
		• Quiz 1
		• Quiz 2

	Diffusion Diffusion and Randomness Vibration and Acoustics Heat Conduction in Higher Dimensions Laplace's Equation Classification of PDEs	

Week 2
(Class 7~12)
	• Partial Differential Equations on Unbounded Domains
	  Cauchy Problem for the Heat Equation
	  Cauchy Problem for the Wave Equation
	  Well-Posed Problems
	  Semi-Infinite Domains
	  Sources and Duhamel's Principle
		• Quiz 3
		• Midterm exam 1

Week 3
(Class 13~18)
	• Partial Differential Equations on Unbounded Domains
	  Laplace Transforms
	  Fourier Transforms
	• Orthogonal Expansions
	  The Fourier Method
	  Orthogonal Expansions
	  Classical Fourier Series
		• Quiz 4
		• Midterm exam 2

Week 4
(Class 19~25)
	• Partial Differential Equations on Bounded Domains
	  Overview of Separation of Variables
	  Sturm-Liouville Problems
	  Generalization and Singular Problems
	  Laplace's Equation
	  Cooling of a Sphere
	  Diffusion in a Disk
	  Sources on Bounded Domains
	  Poisson's Equations
		• Quiz 5
		• Quiz 6
		• Final exam