

MATH 3420: Differential Equations II (TENTATIVE)

TIME AND PLACE: TR 12:30 - 1:50pm - BLB 270

PROFESSOR: Santiago I. Betelú

OFFICE: GAB 316, e-mail: betelu@unt.edu

TEXTS: W. E. Boyce and R. C. DiPrima: “Elementary Differential Equations and Boundary Value Problems”, John Wiley and Sons. 10th ed.

SUPPLEMENTARY TEXT: Stanley J. Farlow: “Partial Differential Equations for Scientists and Engineering”, Dover Publications.

OFFICE HOURS: TR 8:20-9:20am and 11:00-12:20

GRADES: Grades will be based on three midterm exams (20 points each), homeworks (20 points) and a final exam (40 points). The lowest of the midterm grades is dropped, so the maximum score is 100. To earn an A you need 90 points, 80 for a B, 70 for a C and 60 for a D.

HOMEWORK: They will be assigned each class, to be collected the following class. The homework must be clear and show all intermediate steps. Check with the solutions at the end of the chapter, if you don't get them come to my office for help. Remember to write your name, problem numbers, due date and staple each HW.

EXAMS: Midterm exams will be given on Feb 15, Mar 22 and Apr 19 on regularly scheduled class time. The final exam is scheduled on Thursday May 10 at 10:30-12:30 AM on the same classroom (these dates may change, so ask me one week before).

DISSABILITIES: Students with certified disabilities must provide the instructor with appropriate documentation from the Dean of Students Office.

CHEATING: No cheating will be tolerated. Anyone caught cheating will receive an F for the course. Turn off phones during class and exams.

SCHEDULE

Week	Summary
Jan 16	Introduction to PDEs. Reducing number of variables. Traveling waves. Separation of variables. Similarity.
Jan 23	Autonomous systems and stability. Locally linear systems. Competing species. Using energy to study stability. Chaos.
Jan 30	Fourier series. Deriving PDEs using physical principles. Heat equation. General solutions. Applications.
Feb 6	Nonhomogeneous problems. Fourier transform. Integral transforms. Superposition.
Feb 13	Laplace transform. Duhamel principle. Convection.
Feb 20	Traveling waves and similarity. Wave equation and D'Alembert solution.
Feb 27	Boundary conditions for waves. Vibrating string. Fourth order vibrations.
Mar 6	Classification of PDE's. Waves in 2D. Vibrating membrane. Dimensionless problems.
Mar 13	Sturm Liouville theorem. Solving PDEs with eigenfunction expansions and special functions.
Mar 20	Systems of PDE's. Ill posed problems.
Mar 27	Laplace equation in various geometries. Irrotational flow.
Apr 3	Method of Characteristics. Nonlinear conservation laws. Application: traffic in a highway.
Apr 10	Classification of PDE's. Calculus of variations. Minimizing areas and travel times.
Apr 17	Approximate numerical methods. Errors and stability.
Apr 24	Solving Laplace's equation with conformal mappings. Applications: dam problem and temperature distribution.
May 1	General review
May 10	Final Exam Thursday 10 10:30-12:30am