

## MATH 3420: Differential Equations II (TENTATIVE)

TIME AND PLACE: MTWR 10:00 - 11:50 am - PHYS 311

PROFESSOR: Santiago I. Betelú

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**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: MTWR 8:50am-9:50am

**Grading:** Grades are based on two midterm exams (25 points each), homework and special projects (25 points) and a cumulative final exam (50 points). The lowest of the midterm grades or homework is dropped, so that 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.

**Exams:** Midterm exams will be given in class on Jul 19 and Aug 2 on the usual class time. The final exam is scheduled on Fri Aug 10 on the same classroom (these dates may change).

**Disabilities:** 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	Lesson
1	Introduction to PDEs. Reducing number of variables. Traveling waves. Separation of variables.
1	Boundary conditions. Boundary value problems.
1	Fourier series. Deriving PDEs using physical principles. Heat equation. General solutions. Applications.
1	Nonhomogeneous problems. Fourier transform. Laplace transform. Superposition.
2	Traveling waves and similarity. Wave equation and D'Alembert solution.
2	Boundary conditions for waves. Vibrating string. Fourth order vibrations.
3	Classification of PDE's. Waves in 2D. Dimensionless problems.
3	Sturm Liouville theorem. Applications.
3	Systems of PDE's. Vibrating membrane. The Laplacian.
4	Laplace equation in various geometries. Irrotational flow.
4	Method of Characteristics. Nonlinear conservation laws. Application: traffic in a highway.
4	Classification of PDE's. Calculus of variations.
5	Approximate numerical methods.
5	Solving Laplace's equation with conformal mappings. Applications: dam problem and temperature distribution.
Aug 10	Final Exam