MATH 3410.006: Differential Equations I (tentative)

TIME AND PLACE: TR 17:00 - 18:20pm - SAGE 356
PROFESSOR: Santiago I. Betelú
OFFICE: GAB 316, e-mail: betelu@unt.edu
TEXT: W. E. Boyce and R. C. DiPrima: "Elementary Differential Equations and Boundary Value Problems", John Wiley and Sons 11th ed
OFFICE HOURS: OFFICE HOURS: TR 08:00-9:20am and 16:00-16:55pm

Grading: Grades will be based on three midterm exams (20 points each), homework and special projects (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 completed the same day of the following week. 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 Feb 14, Mar 21 and Apr 18 on the usual class time. The final exam is scheduled on Tue May 7, 17-18:20pm on the same classroom (these dates may change). Calculators, electronic devices or notes are not allowed during exams.
Disabilities: It is responsibility of students with certified disabilities to 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.

Week	Sections	Summary
Jan 15	1.1 - 1.2 -1.3 - 2.1 - 2.2	Definition and classification of DE's. Direction fields. Linear 1st order ODEs. Separable ODEs. Homogeneous ODEs.
Jan 22	2.3 - 2.4 - 2.5	Modeling with DE's. Linear versus nonlinear equations. Domain of existence. Bernoulli ODEs. Autonomous equations. Population dynamics. Hanging chains, rockets, thermal problems and other applications.
Jan 29	2.6 - 2.7 - 2.8	Exact equations. Integrating factors. Euler's approximation. Existence and uniqueness of solutions. Change of variables.
Feb 5	3.1 - 3.2	2nd order linear equations. Existence and uniqueness. Equations with constant coefficients. Characteristic equation. Linear independence. Review - Midterm 1
Feb 12	3.3- 3.4 -3.5	Complex roots of the characteristic equation. Euler equations. Reduction of order. More changes of variable.
Feb 19	3.5 - 3.6 - 3.7	Nonhomogeneous equations. Undetermined coefficients. Variation of parameters.
Feb 26	3.8 - 3.9 - 4.1	Mechanical oscillations. Forced vibrations and resonance. Higher order linear equations. Existence of solutions.
Mar 5	4.2 - 4.3 - 4.4	Higher order linear equations. Basic theory. Constant coefficients. Complex roots of characteristic equation. Repeated roots. Undetermined coefficients. Applications to oscillating systems.
Mar 12	5.1 - 5.2 - 5.3	Power series. Solutions using power series near ordinary points. Recurrence formulas and radius of convergence. Basic theorems. Review- Midterm 2
Mar 19	5.3 - 5.4 - 5.5	Regular singular points. Relation to Euler equations. Indicial equation, recurrences and radius of convergence.
Mar 26	5.6 - 5.7 - 7.1	Bessel equation and Legendre equations and applications. Systems of linear equations.
Apr 2	7.2 - 7.3 - 7.4	Review of matrices. Basic theory of linear systems of equations. Solving problems with eigenvalues and eigenvectors. Direction field.
Apr 9	7.4 - 7.5	Applications to systems of equations: connected tanks, systems of springs and masses. Review - Midterm 3
Apr 16	7.6 - 7.8 -7.9	Complex eigenvalues and repeated eigenvalues. Nonhomogeneous systems.
Apr 23	8.1 - 8.2 - 8.3 - 9.1	Basic numerical approximations. Explicit and implicit Euler. Runge Kutta. Analyzing autonomous systems of equations using the phase plane. Application: predator-prey models.
May 7		Final Exam Tue 17:00-18:20pm