
SYLLABUS
Fall 2005
DIFFERENTIAL EQUATIONS (Math 159)*

Dr. Elaydi

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Department of Mathematics

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OFFICE HOURS: TW 1:30 – 3:00

COURSE CONTENT: This course studies modeling and prediction via ordinary differential equations. The techniques are analytical (solving the DE), qualitative (graphical methods) and numerical (approximation methods). Now that computer algebra systems can do much of the routine manipulations the nature of a differential equations course changes to emphasize the use of technology rather than to just compete with it.

PREREQUISITES: The prerequisites for this course are Calculus I, II, and III (Math-156, 157, 158). Students who earn a grade of A or B in Calculus II may take Calculus III concurrently with Differential Equations. Under no circumstances may a student register for Calculus II and Differential Equations Simultaneously. The student should also own and be able to use a scientific calculator with graphing capability.

TEXT: *Differential Equations, 2nd Edition* (Brooks/Cole) by Blanchard, Devaney, and Hall

1. **First Order Differential Equations.** Modeling, analytic technique (separation of variables), qualitative technique (slope fields), numerical technique (Euler's method), existence and uniqueness of solutions, equilibria and the phase line, bifurcations, linear differential equations, changing variables, labs (applications).
2. **First Order Systems.** Modeling via systems, the geometry of systems, analytic methods, Euler's method for systems, Lorenz equations, labs.
3. **Linear Systems.** Basic properties, straight-line solutions, phase planes (real and complex eigenvalues), repeated and zero eigenvalues, second order differential equations, the trace-determinant plane labs.
4. **Forcing and Resonance** (as time permits).
5. **Laplace Transformation** (as time permits).

* Course also supported by a Mathematics Tutorial Lab

EVALUATION:

10 quizzes	(10 each)	100
3 hour tests	(100 each)	300
1 Departmental Final Exam		<u>200</u>
Total		600

Formula for course grade:

A	(540 – 600)
B	(480 – 539)
C	(420 – 479)
D	(360 – 419)
F	(< 360)

SCHEDULE OF TESTS, QUIZZES AND EXAMINATIONS:

Quizzes	Every Tuesday except on October 6 th	
Tests:	Test I	October 6 th
	Test II	November 3 rd
	Test III	December 1 st
Final:	Departmental Common Final	