

MATH-3860 SPRING 2008 SYLLABUS & GRADING
INSTR: DR. NAGISETTY

Textbook: Elementary Differential Equations by Boyce and DiPrima, eighth edition

SYLLABUS

We are going to cover roughly chapters 1–3, 6, 5,4, 7, 8 (in that order) of the text. The last three chapters may not be totally covered but we shall try our best.

Tests: Every other Friday, you shall have a midterm test lasting all 50 minutes. Problems on tests will be very similar to the problems done in class and the problems suggested to be done at home. I would be glad to help you if you come to my office during either office hours or by appointment. You could also phone me in my office(UH2020B) and we sometimes could work on the phone(ext: 2977). **No graphing calculators on tests and the Final.** The dates for the midterm tests are as follows: Jan 18, Feb 1, Feb 15, Feb 29, Mar 21, Apr 4, which is 6 midterms for the whole semester.

Grades:Midterm tests count for 70% of your final grade and the Final counts for 30% of your final grade. The letter grades A, A- etc., are assigned according to the following numerical scale:

$$A \geq 90 > A- \geq 85 > B+ \geq 80 > B \geq 75 > B- \geq 70 > C+ \geq 65 \\ > C \geq 60 > C- \geq 55 > D+ \geq 50 > D \geq 45 > D- \geq 40 > F.$$

Office Hours 1:00–3:00 pm MWF or by appointment. Office is located in the University Hall 2020B where the Math department also is located. My office phone is 5302977 and from within the campus it is simply 2977. Also my e-mail address is "rnagise@math.utoledo.edu".

Material to be covered in some detail

Chapter 1, sections 1,2,3.

The example of a falling body, A case of predator-prey, owls and mice, problem. In this context we introduce direction fields, equilibrium solutions, stable, unstable, semi-stable solutions. Then we solve some simple differential equations by the technique of separation of variables which gives rise to a family of solutions parametrized by the initial conditions. Lastly we discuss naming for differential equations, why some of them are called PDE and others ODE. Some of them are called linear and others non-linear. Also one defines order of a differential equation. Thus by the end of learning these three sections, one should know how to use direction fields to discuss the behavior of solutions and solve some simple equations and plot them and also be able to assign names to given differential equations.

Suggested Problems:

1.1: 1,3,5,7,9,11,14 on pp.7--8.

1.2: 1a,3,6,7 on pp.15--16.

1.3: 7,10,14,15,18,19,20 on pp.24--25.

Chapter 2, sections 1–3,5,6,8. Section 4 will be touched up on but sections 7,9 will be skipped. These deal with basically all interesting types of first order ODE. Each section deals with a specific type of equation and may apply to practical problems. Thus the aim of this chapter is not only to learn particular techniques and master them by repetitive, almost identical procedures but also to go outside repetition and improvise to meet variable situations. We first go lightly over sections 1 and 2 and go to section 3 and then come back to sections 1 and 2. After that we cover sections 5 and 6. Section 8 is very theoretical but must be understood.

Suggested Problems:

2.1: 1,13,15,19,27,29 on pp.39--40.

2.2: odd problems from 1--20,31--38 on pp.47,48,50.

2.3: 2--5,7,8,22,24,27 on pp.59,60,64,65.

2.4: Odd ones from 1--17, and 19,21,27 on pp.75,76.

2.5: 1--7,9,10,15--18,20,25 on pp.88--90,92.

2.6: 1,3,4,9,10 on pp.99,100.

Chapter 3, sections 1–9. This deals with second order ordinary differential equations.

Suggested Problems:

3.1: 2,6,8,12,14,16,18,20,22, odd problems from 28--39

3.2: 2,4,6,8,10,12,14,16,18.

3.3: 2,4,6,8,10,12,14,20,28.

3.4: odd problems from 1--16 and 19,21,23,24,26,29,33

3.5: even problems from 1--14 and 15,17,26,27,32,38,39,40

3.6: 1,3,5,8,13,16,29.

3.7: odd problems from 1--12 and 13,17,19,29,30

3.8: 1--4,6--14,31,32(challenging)

3.9: 1--8,11,16

Chapter 6, sections 1–6. This deals with **Laplace** transforms which is very popular with Engineers. There are many other transforms that Engineers use but this gives a strong basis for understanding other transforms as well. This shows how these transforms work, what are their interesting and useful properties, and what can you expect to do with them.

Suggested Problems:

6.1: 5--20, 27

6.2: even problems from 1--24

6.3: 1--3, 7, 9, 13--18, 27, 28, 31,32

6.4: 1, 6, 12, 16

6.5: 1--10

6.6: 4--10

Chapters 4 and 7. These deal with higher order differential equations which can be converted into first order systems. These are better done with Maple because the calculations involved are tedious and time consuming. You can access the lab and work on these chapters right after we are done with chapters 2 and 3.