Short Guide to APPM 2360 Differential Equations with Linear Algebra Section 110

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1 Introduction

This course is about differential equations and linear algebra. The course website (for all sections of the class) where the homework, syllabus, and official policies are posted is at: `http://www.colorado.edu/amath/course-pages/spring-2016/appm-2360-differential-equations-linear-algebra-spring-2016`. The purpose of this pdf is to give you a rough overview of the course and offer some suggestions which you may find useful.

The textbook is Differential Equations and Linear Algebra by Farlow, Hall, McDill, and West, 2nd edition. Note that it seems to come with two different covers. Make sure ISBN is $0 - 13 - 186061 - 5$.
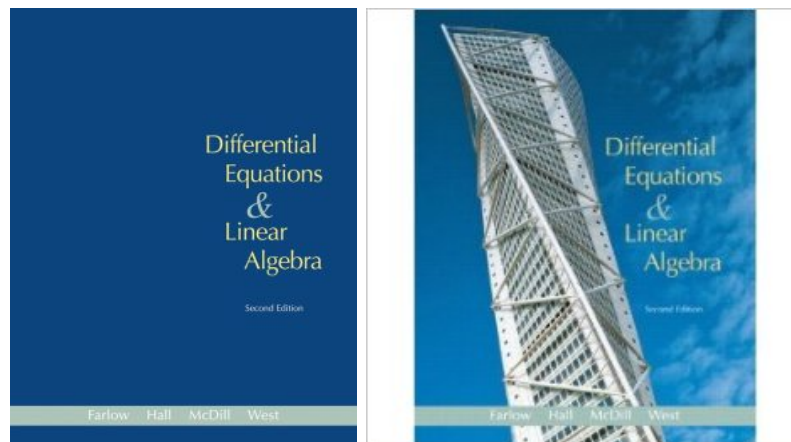

Figure 1: `http://www.barnesandnoble.com/w/differential-equations-and-linear-algebra-jerry-farlow/1100057512?ean=9780131860612`

Homework assignments will be due weekly. Homework is turned into your TA (for your recitation section). Your base grade will be based on homeworks, exams (3 midterms and a final), and computer projects for a total of 1000 points. Each component has a sizeable contribution to your final grade

(hw and projects count for 30%, midterms and final count for 70%) - see syllabus for more details. In past semesters, a grade of B-, corresponded to average or better performance over all components of the course (that is average or better total score out of 1000 for all students). It is important that you are aware of the following course grading policy that all instructors have to adhere to: if you do not get a sufficiently high average exam score (regardless of your scores on other components) you will get an F in the class. The cutoff is set at around mean minus 1.7 std deviations taken over all the exam grades in the course (all sections). Thus, it is crucial that you properly prepare for the exams. The best way to do this is to do the homework, review and understand examples given in class and look through additional examples on the presented material (provided in the book and from other sources). Alongside this, it is very useful to work through old posted exams, available here: `http://amath.colorado.edu/appm-2360-exam-archive`. The exams will be similar to previous exams.

2   Solved Problems

I encourage you to review and understand as many solved problems as possible. This greatly improves your chances of doing well in this class. I will present solved problems in class each week, which will be related to some of the assigned homework problems and problem types useful to know for the exams. There are several free or inexpensive resources you should be aware of. One is Paul's Online Notes `http://tutorial.math.lamar.edu/Classes/DE/DE.aspx`. which has an excellent collection of examples. I recommend you make use of this resource. There are several free textbooks available online which contain useful examples. You should be aware of: `ramanujan.math.trinity.edu/wtrench/texts/TRENCH_DIFF_EQNS_I.PDF` and `http://www.jirka.org/diffyqs/diffyqs.pdf`. Professor William Trench has several free textbooks and student solution manuals available for download: `http://ramanujan.math.trinity.edu/wtrench/texts/index.shtml`.

You may also purchase some inexpensive problem books. For example, the problem books shown in Figure 2 may be useful. Dover Publications also has a number of low cost mathematics (and physics) books on various subjects: `http://store.doverpublications.com/by-subject-mathematics.html`.

3   Recitation, Help Room, and Office Hours

You will need to register for a recitation section. The recitation instructor will go over material helpful to the HW with you each week and will go over additional examples. The TAs will grade your hw and projects and hold office hours for help. For help with lecture material and additional homework and exam prep questions, use the office hours for each instructor. Collectively, the instructors are available many hours per week.

4   Software

You will be using Matlab for the projects. It is also useful to be able to use Mathematica, especially to check symbolic calculations and plot slope fields. Matlab and Mathematica are available for free

for personal use from the University. It's a good idea to install them at the beginning of the semester. Mathematica is especially useful for plotting slope fields which you will need to do early on. See here: `http://demonstrations.wolfram.com/SlopeFields/`. A software package called Maxima `http://maxima.sourceforge.net/` is an open source completely free computer algebra / plotting system which can be quickly installed on various operating systems and has syntax similar to Mathematica. It uses the package gnuplot for plotting. You can install the wxMaxima package on some systems which provides a nice GUI interface `http://andrejv.github.io/wxmaxima/`. Mathematica (and Maxima) is able to solve simple ODE problems. The package Octave `https://www.gnu.org/software/octave/` is an open source Matlab alternative with nearly equivalent syntax and similar growing functionality. You may also find these different packages useful for evaluating complicated integrals, solutions to differential equations (both analytical and numerical), plotting, and for doing linear algebra. This software can be very useful if you learn how to use it.
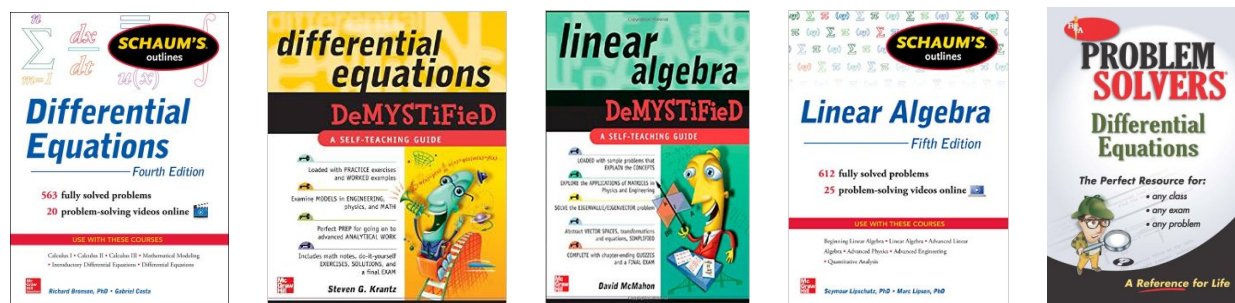

Figure 2: Some books with problems. Book 1: `http://www.amazon.com/Schaums-Outline-Differential-Equations-Outlines/dp/0071824855/`, book 2: `http://www.amazon.com/Differential-Equations-Demystified-Steven-Krantz/dp/0071440259/`, book 3: `http://www.amazon.com/Linear-Algebra-Demystified-David-McMahon/dp/0071465790`, book 4: `http://www.amazon.com/Schaums-Outline-Linear-Algebra-5th/dp/0071794565/`, book 5: `http://www.amazon.com/Differential-Equations-Problem-Solver/dp/0878915133/`