SYLLABUS

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| **Term:** | **Spring 2014** |
| **Course:** | **Math 320 – Linear Algebra and Differential Equations** |
| Textbook: | "Differential Equations and Linear Algebra" by Edwards and Penney (3rd Ed.) |
| **Lecture Time:** | **2:30 PM to 3:45 PM Tu/Th** |
| **Lecture Location:** | **Van Vleck (math) B102** |
| **Instructor:** | **Sean Rostami (srostami@math.wisc.edu)** |
| Instructor Office: | Van Vleck (math) 313 |
| Office Hours: | TBD |
| **TA/Discussion:** | **Varies – check your student webpage** |

## Administration

**The primary way that I will distribute materials to you is Learn@UW.** Homework will be posted here, grades and statistics will appear here, etc. **I will send many emails via Learn@UW so please determine which of your emails is used by Learn@UW and check it regularly.**

**It is important that you always view the homework etc. directly from Learn@UW.** Why? Because I frequently decide that I want to add a hint, make a remark, or fix some typos and it is very annoying (for both of us) if I notify the entire class every single time I make a small change.

**I will soon activate the "Discussions" feature on Learn@UW**, which means that you can post any questions you may have and also respond to other students' questions (I will also respond personally to most of these questions). **Anonymous posting will be possible.**

The purpose of lecture is to motivate topics, summarize and distill the main facts, explain why and how they work, and to investigate some key examples when appropriate. The purpose of discussion is to provide more details of lecture topics, provide more examples, and hints for homework. The purpose of office hours is to provide very personalized help. This means that the lecture is not simply a time for me to do sample questions from the textbook, and the discussion is not simply a time for the TA to answer your homework questions.

## Topics

**Here is an *approximate* list of items that we will discuss.** The time required to accomplish a particular item depends on the item. *The number in each item is my estimate of how many lectures will be used for that item.* It is possible that we may not finish the entire list by the end of the semester. *I reserve the right to deviate from this list if necessary.*

- Review of some important functions and some calculus theorems **[1]**
- Basic terminology for differential equations and identification of those relevant to 320 **[1]**
- Survey of "idealized" problems modeled by differential equations (no solving) **[2]**
- Existence, Uniqueness, and Construction for 1st-order linear differential equations **[2]**
- Applications to the idealized problems **[2]**
- More general numerical approach to differential equations: slope-field, Euler's method, etc. **[3]**
- Higher-order linear differential equations, part 1: terminology and examples **[2]**
- Linear algebra, part 1: vector spaces, linear maps, basis, dimension, etc. **[3]**
- Linear algebra, part 2: function spaces, derivatives as linear maps, linear systems, etc. **[2]**
- Higher-order linear differential equations, part 2: existence/uniqueness (no construction yet) **[1]**
- Roots-method for constructing solutions to (constant coefficient) higher-order linear ODE **[2]**
- Taylor-method for constructing solutions to (analytic coefficient) higher-order linear ODE **[2]**

- Systems of linear ODE, part 1: terminology and examples **[1]**
- Linear algebra, part 3: eigenvalues and eigenvectors **[2]**
- Eigenvalue-method for constructing solutions to systems of linear ODE **[2]**

It is my feeling that the most difficult part of this course will be, not the *math*, but the *interpretation* of the physical situations that are described using English. These descriptions are frequently imprecise and sometimes contain "hidden" assumptions. To interpret such statements is difficult for everyone, not only the students. We will try our best!

## Weights and Grading

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| **Homework** | **10%** |
| **Exam #1 (T Mar 04 evening)** | **20%** |
| **Exam #2 (R Apr 24 evening)** | **25%** |
| **Final Exam (F May 16)** | **45%** |

**I will use the standard 90/80/70/60 system for grading.** This means that if you earn an overall score of at least 90% then you will receive an A, if you earn at least an 80% but less than 90% then you will receive a B, etc. Scores that are very close to (and below) 90% and 80% will receive an AB or BC when appropriate. **For exams, you receive points only for making progress towards the goal**, you do not "lose" points for "mistakes". This means that it is possible to receive 0 points for a very large and time-consuming response.

## Miscellaneous Information

**You will sometimes need a calculator for computations—**an ordinary scientific calculator should be fine (no need for a fancy one). **The material will frequently require some knowledge of classical mechanics**, which we will discuss as necessary (minimally, as 320 is not a physics course).

**Homework will be assigned on Tuesday and Thursday and both parts due the following Tuesday.** It is a good idea to start the Tuesday homework on Tuesday or Wednesday. *I may occasionally omit a homework assignment or change the due date.* Due to the large number of students, your TA will grade only a small number of exercises (frequently only one). This does not mean that the other exercises are unimportant—it is simply impossible to grade everything.

**Exam #1 will occur the evening of Tuesday March 04 in a special room (TBD) and Exam #2 will occur the evening of Thursday April 24 in a special room (TBD).** *I reserve the right to change the dates of Exam #1 and Exam #2 if necessary.* I will not personally offer any "review sessions" but I plan to hold extra office hours in the days before the exam. **The Final Exam is Friday May 16 (the room is currently unknown).** Roughly speaking, the topics of Exam #1 and Exam #2 will be the first and second sets of six ♦ items from the above list. **The Final Exam is cumulative.**

I think it would be very worthwhile to include some coding (e.g. MATLAB) in a course like this. However, coding is not explicitly mentioned in the official description of the course and the level of general familiarity with coding varies greatly from student to student, so I would be drowned in a sea of complaints anytime a bad grade was received for a coding-related assignment. So, no coding will be done, except occasionally by me for the purpose of lecture.

Finally, I sometimes use words like "clearly" or "obvious" in lecture. This is very common in mathematics culture and is not meant to be rude or arrogant. The purpose is only to help distinguish between the situations where you need an unusual idea and the situations where you don't. If something is described as "obvious" but does not seem obvious, it is possible that there is another perspective from which the assertion would be much more clear, and it is a good idea to try to find this perspective.