Phys 2022 **Classical Physics** **Spring 2010**

M,W,T,F at 9:00am

Instructor: Sergei Katsev
Office: 352 MWAH
Office hours: MWF 10-11am.
Phone: 726-6057
E-mail: skatsev@d.umn.edu
Course web page: http://www.d.umn.edu/~skatsev/Phys2022.htm

Prerequisites: General Physics II (Phys 2012), Calc II (Math 1297)

Texts: *Vibrations and Waves* by A.P. French;
University Physics by Young and Freedman or *Fundamentals of Physics* by Halliday, Resnick, and Walker.

Course content: We will begin with a review and extension of selected concepts covered in Phys 2011-2. The emphasis will be on more substantial use of techniques from calculus and vector operations. We will then undertake a systematic study of the physics and mathematics of oscillatory motion, ranging from masses on springs through waves in various media onto AC electrical circuits and wave phenomena in optics. This will include practice with complex numbers and the use and solution of differential equations.

Grading: Course grades will be based on these contributions and associated weights.

- Mini-quizzes (about 4) - 10%
- Tests (about three) - 60%
- Final exam - 30%

The expected grading scale is:
93% A, 90% A-, 87% B+, 83% B, 80% B-, 77% C+, 73% C, 70% C-, 67% D+, 60% D

Missed tests and homework will count as zero. There will be no curving.

Class participation: There is no grade bonus for class participation, nor there is penalty for missed classes. However, active thinking in class and good note taking will make your life much easier. The textbook by French is difficult. Lecture notes are there to help you. Thinking while you take them and asking questions in class will cut your preparation time by half.

Homework: Recommended reading and problems will be assigned regularly but will not count towards the final grade. You are nevertheless encouraged to submit these assignments, in which case you will receive a grade (solely for your information) and my feedback on your solutions. Homework solutions should demonstrate the knowledge of both physical concepts and the associated mathematical aspects. Most problems will involve the old-fashioned, hand-crafted mathematics. Use of computer packages, such as

Mathematica or MatLab, is not acceptable as a substitute, unless this is explicitly specified. Mathematical calculations should be accompanied by brief English explanations of your reasoning. The explanations should be as simple as possible, but not simpler. Discussion of homework problems with classmates is permitted and encouraged. All work turned in must be your own, i.e. you should be able to present your solution and explain it. Here are a few suggestions for doing and writing up these homework problems:

• Make the question part of your answer. Your solution should make clear what the problem asks. It shouldn't be necessary to consult the problem statement to figure out what problem is being solved.

• Include diagrams. Visualizing the problem whenever possible is a useful habit. Make your drawings large and clear. Use the diagram to define quantities and symbols used in the mathematics.

• Start by understanding the physical principles involved. Basic formulas are easy to remember, and more complicated ones are often easy to derive if you understand how they came about. The question "***Which formula do I use*?**" is a bad one to ask. When you understand the underlying physical processes, the answer is almost always obvious.

• Use standard and correct notation for physical variables.

• Work problems symbolically as far as possible. Plugging in numbers should be done after all the algebraic manipulations.

• Show units for all numerical values, including those in the intermediate calculations. Dimensionality analysis is very useful and helps avoid trivial mistakes.

Individuals who have any disability, either permanent or temporary, which might affect their ability to perform in this class, are encouraged to inform the instructor at the start of the semester. Adaptation of methods, materials, or testing may be made to provide for equitable participation.