PHYS224
Introductory Physics III
Spring 2014

Lecture Hours:	MWF 2:00 – 2:50 PM, in Math & Psychology 102
Instructor:	Matthew Pelton
Office:	Physics 313
Office Hours:	MF 3:00 – 4:00, or by appointment
E-mail:	mpelton@umbc.edu
Texts:	George C. King, *Vibrations and Waves* (main text)
	Eugene Hecht, *Optics* (suggested additional text)

Course Objectives

The primary goal of this course is to provide the physical concepts and mathematical tools needed to understand vibrations and wave motion. The course will focus on mechanical vibrations and waves and on optics (electromagnetic waves), but the ideas and techniques will serve as a foundation for understanding and analyzing advanced topics throughout the physical and applied sciences. The course will serve as a bridge between the general topics and simple problems of the introductory physics courses you have taken before and the more specialized topics and complex problems of the advanced courses to come.

You will have succeeded in the course if you can understand how to approach a wide range of complex systems using a relatively small number of physical ideas and mathematical tools. You will have succeeded even more if you can use that understanding to gain insight into the physical phenomena we experience every day, from the operation of musical instruments to the workings of the eye.

Grading

The largest part of your grade will be based on two mid-term exams and a final exam. All exams are closed book, and no electronic devices of any kind may be used during the exams. You may bring one page of hand-written notes into the exams.

Most of the rest of your grade will be based on homework assignments (see below). In addition, there will be a number of unscheduled in-class quizzes, to make sure you are keeping up with the course content, and to see which areas may need extra emphasis.

The final score will be calculated as follows. The course will not be graded on a curve.

Homework:	30%
2 mid-term exams:	30%
Final exam:	35%
Quizzes:	5%

Material

This course will cover the physics and mathematics of vibrations and waves. The first part of the course will describe oscillations, starting with a simple frictionless mass on a spring, and moving towards more complex systems with external forces and multiple interacting objects. The second part will describe waves, oscillations that travel from one location to another. The third part of the course will illustrate key concepts and mathematical tools by investigating light, an electromagnetic wave that plays a particularly important role in our lives.

Part 1: Vibrations

- Simple harmonic oscillators
- Damped oscillators
- Driven oscillators and resonance
- Coupled oscillators and normal modes

Part 2: Waves

- Standing waves
- Traveling waves
- Boundary conditions
- Superposition of waves
- Dispersion

Part 3: Optics

- Electromagnetic waves
- Reflection and refraction
- Simple optical systems
- Interference
- Diffraction

Homework

A central component of the course will be the weekly problem sets. Assignments are due at the beginning of every Wednesdays class, unless you are told otherwise. No late assignments will be accepted.

Compared to your previous classes, you can expect to solve a smaller number of more complex problems. This is closer to how real scientists and engineers work, and you can expect the problems to get more difficult and involved as you move into more advanced classes.

Because the problems are more involved, you may find you need help with them. You are encouraged to visit me during my office hours or by appointment to discuss any problems or concepts you are finding difficult. I am also happy to discuss any other course-related matters, academic or career issues, or physics in general.

You should also seek out help as needed from other people, including your fellow students. Getting tips from other students can often be the best way to understand the

problems and to avoid getting stuck. But this does not mean that you are allowed to copy or paraphrase somebody else's answers. Most students understand the difference between getting help and having somebody else do the work for you, but please see me if it's not clear to you. As a way of making sure that the difference is clear, you are required to acknowledge on your homework any help you get from other people or outside resources, including working in a group, getting an explanation from another student, or looking something up on the internet or in a text.

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory.

Please pay attention to the rules (above) regarding collaboration on homework. No collaboration of any kind is allowed during exams; in addition, no textbooks or electronic devices are allowed. Misconduct, such as cheating or plagiarism, will result at a minimum in a zero on the corresponding assignment or exam and a report to the Academic Misconduct Reporting Database.