

PHYSICS 170

General Information Fall Semester 2017

<u>Laboratory:</u> Room 1235 BPS	<u>Hours:</u> 6 per week
<u>Instructors:</u> Richard Hallstein	Office: 1253 BPS Telephone: 884-5509 email: hallstein@pa.msu.edu
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Physics 170 is a special course in EXPERIMENTAL PHYSICS for first-year students. The main aim of the course is to have you learn something about REAL physics as done in a research laboratory. There will be no formal lectures (or exams) so that all of **your learning** will be done by: (1) reading (in class), (2) having discussions with your lab partner and the instructors, and (3) performing "hands-on" experiments. Notice the emphasis on "**your learning**" in the previous sentence - after all, learning on one's own is an important aspect of doing physics research.

In this course we will emphasize several aspects of experimental physics:

1. How to conceive, set up, and perform experiments in a few selected areas of physics.
2. How to use the computer to:
 - a) Acquire, graph and analyze your data.
 - b) Simulate your experiment.
3. How to keep a neat and meaningful laboratory notebook.
4. How to present your results in both written and oral format.

Since there will be no examinations, your **grades** will be determined by:

1. How you perform in laboratory -- in particular how your experimental techniques and thought processes develop as the semester progresses. (45%)
2. The quality of your laboratory notebook and how it develops as the semester progresses. To evaluate your progress, we will collect your notebooks both at times that are announced in advance. (45%)
3. During Finals Week, each of you will have a private, \approx 20-min "discussion" with the instructors in the laboratory. We'll be interested in determining what you've learned. (10%)

At least twice during the term, you will be given a numerical evaluation of how you are doing.

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The experiments involve two areas of physics:

1. Vacuum Physics:

- a) How to produce a vacuum and what interesting physics you can do with it.
- b) Learn what is meant by the peculiar statement, "The lack of a perfect vacuum has structure."

2. Optics

- a) How light rays are bent and optical images are formed--from a single lens to a reflecting telescope. These studies will include actual experiments, computer simulations, and instrument building
- b) Optical spectra. Over what range of wavelengths do various light sources emit light? (lamps, lasers, etc.)

You and your partner will spend about 1/2 the term on each area. If you miss **any** of the laboratory sessions during a given half term, you are **required** to make them up before that half term ends.

We hope that all of you have had some experience with computers; but if you haven't, don't worry about it. We will help you learn everything that you need to know. You will not be expected to write programs. Most of the gathering, graphing, analyzing, and simulating of data will be done on either commercial or locally-produced programs.

No text is required for the course. You will be given one copy of a laboratory notebook in which you will record your progress.

Spartan Code of Honor and Academic Pledge

As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.