

## **INTRODUCTION – SECTION ONE MECHANICS**

One of the main reasons for having a physics laboratory is for you to learn about physics through your own direct experience. This puts more of the responsibility for learning on you.

We want you to learn about the physical world through careful observation, measurement, and experimentation. While lectures and textbooks are a very efficient way to study a broad range of topics, books represent someone else's authority. You must follow their logical arguments and explanations to tell you how things work. In the lab, we want you to discover for yourself something about physics and its explanation of nature. This is a hand – on approach. A good lab experiment is really attempting to mimic the way physical science and research make progress. Experiments and new data require new hypotheses and theories to explain what's observed. In turn, theories will predict previously unobserved phenomena and new experiments are done. Both experiment and theory are necessary for science and technology to progress.

It's unlikely that you'll make any profound or totally new discoveries in this lab. If any misconceptions are corrected and a more accurate picture of how the physical world behaves, then part of our objectives has been met.

We also want you to learn some good laboratory skills. In the first series of experiments, the emphasis is on learning to intelligently manipulate apparatus, making measurements, analyzing the data, estimating errors, and reaching conclusions. This will require that you pick up basic skills in statistics and learn to write a professional quality lab report.

Physics lab reports at UAH are like any standard technical report that you may be required to write in the future as professional scientist or engineer. The principle differences are that your report as a student will likely be shorter and you'll only have a few days to prepare it. Therefore, keep your reports concise, to the point, and of course, they must be your own work. The format we require is:

Title:

Purpose:

Equipment or Apparatus:

Method:

Results:

Discussion and Conclusion:

This first section of the UAH series of physics laboratory experiments covers the subject of mechanics. You'll be looking at ways to carefully observe and directly measure mass, position (length) and elapsed time. From these experiments and measurements you'll be able to calculate a variety of physical quantities such as force, velocity, acceleration, momentum, kinetic energy, period and frequency, and moment of inertia. Sometimes you'll be asked to find the relationship between these quantities. Sometimes you'll be asked to "measure" the value of physical constant such as acceleration of gravity,  $g$ .