## **PHY 204 General Physics Laboratory Fall 2014**

## **W 2:00 - 3:45 Section 101 Science 103**

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## **Office hours: MWF 11:00-11:45, TR 2:00–4:00, W 4:00-5:00 or by appointment**

## **University Policies:** By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to <http://www.marshall.edu/academic-affairs/?page_id=802> Academic Dishonesty/Excused Absence Policy for Undergraduates/Computing Services Acceptable Use/Inclement Weather/Dead Week/Students with Disabilities/Academic Forgiveness/Academic Probation and Suspension/Academic Rights and Responsibilities of Students/Affirmative Action/Sexual Harassment

## General Physics Laboratory. 1 credit hour

## Required of all students taking PHY 203 or 213, unless exempt by special permission.

## **Goals/Outcomes:**

## A. Students will learn basic physical measurement practices for typical electrical, optical, and atomic experiments.

## B. Students will write laboratory reports for each experiment. The reports are expected to contain clear, complete statements of the work done. The reports should include logical conclusions about the relationships of the data collected.

## C. Students will be graded on the completeness and relevance of the laboratory reports. Students will be given exams that require the student to demonstrate their knowledge of the principles covered in the laboratory exercises.

## **Required Textbook:** General Physics Laboratory Manual, Physics 204, 3rd Edition, Fall 2014

## Course Requirements: Students will be expected to complete:

## Twelve experiments involving electricity, fields, electric circuits, thin lenses, optical instruments, physical optics, and atomic spectra.

## Laboratory reports using logical analysis of the laboratory data.

## Two exams on the laboratory experiments.

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## Attendance: Students are expected to attend all scheduled laboratory sessions. No student should ever miss a laboratory and then use someone else’s data. That will result in a zero grade for the experiment. The purpose of the laboratory experience is to learn to collect data, analyze the data, and write a logical explanation of what was measured or observed. See University Policies above for the attendance policy.

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## **Laboratory Schedule:**

## **Date: Experiment**

## August 27 Lab 1: Law of Charges

## September 1 Labor Day – No classes

## September 3 Lab 2: Electric Field and Potential

## September 10 Lab 3: Kirchhoff’s Laws

## September 17 Lab 4: Introduction to the Oscilloscope

## September 24 Lab 5: The RC and RL Series Circuit

## October 1 Lab 6: The LRC Resonant Circuit

## October 8 Lab 7: Transistor Amplifier Characteristics

## October 15 Lab 8: Reflection and Refraction

## October 22 **First Lab Exam: Labs 1 through 6**

## October 29 Lab 9: Thin Lenses

## November 5 Lab 10: The Telescope and the Microscope

## November 12 Lab 11: Diffraction and Interference

## November 19 Lab 12: The Atom

## November 24 - 29 No classes – Thanksgiving Break

## December 3 No laboratory – Dead Week

## December 8 (12:45 – 2:45pm) **Second Lab Exam: Labs 7 through 12**

## **General Information:**

## The purpose of these laboratory exercises is to provide you with practical experiences that complement the material that you are introduced to in the lecture course. Unfortunately it is not possible to always time an experiment with the presentation of similar material in the lecture course. You are expected to read over the theory and procedure for each laboratory before you come to the laboratory class. This will help you to understand the material being presented and it will help you to ask more intelligent questions when something does not work.

## The experiments cover several concepts in electricity, some concepts in optics, and a single concept in radiation. In most cases you must set up apparatus, test to see if it works, and then take data. You will normally work in pairs, except when lack of equipment demands that larger groups work together. You are encouraged to talk over any part of the experiment with your laboratory partner, or with people from other laboratory tables within the classroom. You can often discover mistakes by simple communication. At the end of the laboratory period you are to have the instructor *initial* your data sheets as a consistent part of the procedure. The laboratory reports are due at the *beginning* of the next laboratory period following the completion of the experiment. This is not a course where you can come in later in the week to finish an experiment. You are expected to complete data collection within the two hour class period. Actual data values often vary from laboratory table to table. Even a piece of wire can change some results. If need be, you can finish calculations, answer the questions, and write a conclusion after class and before the next class. If the calculations give you problems ask questions during the laboratory or during office hours.

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## Your completed laboratory report should include all laboratory manual pages on which there is data entered, calculations done, questions answered, etc. Sample calculations should be done for each type of calculation no matter how simple or complex. A proper sample calculation for a given step should have the formula, one set of numbers appropriate to that calculation, and the result for the chosen set of numbers. This will allow the grader to determine if you have used the numbers correctly. Do not show every piece of arithmetic used in the calculations, but show one example of each type.

## The discussion or conclusion for every experiment should make a statement about what you have achieved by doing the experiment. Be specific, discuss numbers and graphs and how they prove or do not prove the object of the experiment. As you do experiments try to visualize where error arises and how it can change your results. Evaluating your data and results in an effort to understand whether the results are meaningful is a valuable part of experimental science, and a very hard part. Discussion of error is a part of each conclusion. The discussion could represent twenty percent of a grade for a specific report. The discussion would typically be from one-half to one page long.

## **Grading:**

## Your laboratory grade will be determined by:

## Laboratory Report Average 60%

## Two Laboratory Exams (20% each) 40%

Possible points from pre-lab quizzes if given.

## **You must pass one exam in order to pass the course!** The scale is very rigid at 90, 80, etc. The schedule of exercises is given above. Each student at a laboratory table is expected to contribute to all parts of each experiment. If one laboratory partner is observed to be consistently letting his/her laboratory partners do all or most of the work that person can lose points from the total at the end of the course. A laboratory experience is a hands-one experience! You are expected to be in the laboratory every scheduled day and on time. You are to always use data collected *by you* in an experiment. You are not to use data from someone else. Any absence must be discussed with the instructor as soon as possible. Excused absences must have a prompt make-up date scheduled. This is the student's responsibility, not the instructors. If you miss a class with a valid reason you must see the instructor about a make-up time as soon as possible. **Working out data collected by someone else in the laboratory is not acceptable laboratory practice. That will get you a zero for the experiment.**

## Cell phones, pagers, and other electronic communication devices should be turned off during class time.