

INTERMEDIATE PHYSICS LABORATORY
PHY 300-01
FALL 2005

Instructor:	Dr. Wayne Bresser	Office Hours: MWF 1:00-2:00
Office:	SC 143 / SC 141	TH 12:10-1:00
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Contacting
Instructor:

As you can see, I have office hours during the week, and I will try to be in my office and available to talk with you during those times. However, I have an open door policy, so please don't feel limited to my "official" office hours. Particularly if you have a quick question, feel free to drop by anytime. Or, if you prefer, feel free to contact me to set up an appointment.

Class Time/Location: MW 3:00 – 4:40 PM SC 106

Required Texts:

A lab notebook is required.

In addition, you may need to photocopy some materials. You will have access to equipment-specific reference materials as well as materials in the library, e.g., textbooks and journals. The Internet should also serve as a supplemental source of information.

Co-requisite: PHY 361

Credit Hours: 2 hours

Objective: You will explore physical phenomena at a greater depth and wider content range than in the PHY 220-222 labs and introduce you to some of the more sophisticated techniques of data acquisition, analysis, and interpretation.

Attendance: You are expected to attend all lab meeting times and to spend additional time working on the projects.

Format:

The course is scheduled for two one hour forty minute periods per week. As in previous lab courses, a substantial time investment over and above this will likely be necessary. I will do a minimal amount of lecturing, but will work closely with you on matters involving design and implementation of the experiment, analysis and interpretation of the data, etc. The presentations and experiments will usually take two - three weeks to carry out. You will work in groups of two or three. Within each group individuals will have varying responsibilities, such as theory, equipment, writing of reports. Responsibilities should be divided equally. I will intervene if there are problems.

Lab Notebook:

A lab notebook to record all data, equipment used (including model, identifying number), diagrams of setup, procedures, comments, summaries is required. All entries must be dated. You should summarize your efforts each time you work on the lab (at least one entry for a given day). Never delete anything from this notebook. You should note it as "Bad data" and explain why it is bad. This book should be bound (preferably with numbered pages). We will check this periodically. You must have it with you whenever you are working on an experiment.

A copy of your data may be kept on the network. You should also keep a copy on diskette. In your notebook, identify the data set and everywhere it is located. The network may be cleared or inaccessible at times, so MAKE COPIES. Murphy's Law does work – especially in lab environments. If you fail to follow procedures, (collect data on scrap paper) the data may disappear (usually just after you collected the last data point).

Equipment:

All equipment must be checked-out for an experiment done outside Room 106 and checked back in before the lab report is handed in. To check-out equipment, fill-in the information required in the white binders found in each room.

Experiments:

For this semester you will perform experiments primarily from the area of modern physics (as in connection with PHY 361). The following is a list of typical experiments:

Experiments

Speed of light – Metrologic apparatus
Speed of light – Olaus Rømer experiment
Michelson interferometer
Photoelectric effect
Electron e/m ratio
Millikan oil drop experiment
Optical Spectra
Speed of Cosmic-Ray Muons
Muon Lifetime Experiment
Properties of microwaves
Mössbauer Spectroscopy
Electron Spin/Nuclear Spin Resonance

Lab Report: All lab reports should be typed, double-spaced using Times New Roman font (font size of 11). The page (8 1/2" by 11") should be set with 1" margins. You will hand in a hard copy of the paper and an electronic copy via e-mail or computer disk. The reports should be done using MS Word.

Grading: Grades will be based on the submitted report, the class presentations, the lab notebooks, the observed laboratory techniques and group interaction. Each lab report will have a grade assigned to it. The lab notebook will also be graded individually.

Your final course grade will be determined by the following:

Labs reports	70%
Presentations	20%
Lab notebook	10%

There is no extra credit.

FORMAT FOR WRITING A LAB REPORT

1) **LAB INFORMATION**

Title, authors, and date(s) of performing experiment.

2) **ABSTRACT**

A very brief overview of the purpose (goals) and the main results of the experiment. If a known physical quantity was measured in the experiment then you should state the numerical value of the result that you obtained for that quantity and also state how close your result was to the expected result.

3) **INTRODUCTION**

Describe the physics of your experiment. Include diagrams, graphs, and other visuals which have been discussed in class or which you found in books, the Internet or other sources. Discuss the physical principles in detail, writing as though your audience was an individual who knows little about your experiment. Define terms, discuss equations and be sure to reference your sources.

4) **MATERIALS and APPARATUS**

List the equipment that you used in the experiment.

5) **EXPERIMENTAL PROCEDURE**

Describe what you did, in order. The procedure may include diagrams or other helpful information that will make the lab easier to perform. The procedure should be complete enough so that an individual could read your procedure and could perform the lab as you did. Don't report numbers or results in this section.

6) **OBSERVATIONS/DATA**

List and describe the raw experimental data collected during the experiment. Data should always be reported in a clear and organized way. Use a spreadsheet program to organize and analyze your data. Include all plots and graphs in this section. The axes of all graphs should be clearly labeled (quantity and units) and each graph should be titled so that it clearly indicates exactly what data are being plotted.

7) **CALCULATIONS and RESULTS**

List the equation(s) and show a sample calculation(s) that you carried out. Then state the result(s) of the experiment and compare your result(s) to the accepted or theoretical value(s) (if available) by computing a percent error. Also state what you consider to be the most likely causes of this error.

8) **CONCLUSIONS**

Discuss the findings, i.e., discuss what the data tell you and what conclusions you can draw from the experiment, and give improvements for future experiments.

YOUR LAB RESPONSIBILITIES:

1. Never eat, drink, or smoke in the laboratory.
2. Know the location of the nearest fire exit, emergency telephone, and available fire extinguishers, which will be pointed out by your instructor during the first laboratory session.
3. Immediately report any accidents or injuries to your instructor.
4. Come to lab prepared - read the printed experiment beforehand. Pay particular attention to safety instructions or warnings. Follow such instructions or obey such warnings fully and completely.
5. Carefully listen to the instructor's introduction, especially with regard to any safety warnings or instructions. For your safety, follow these instructions fully and completely.
6. Be sure you understand the proper operation of any electrical or electronic equipment before turning it on or otherwise working with it. Serious harm can result from the improper use of such equipment, or the equipment itself may be damaged or otherwise rendered unusable.
7. Exercise caution in using glass equipment. Do not use any glass equipment that is cracked or broken.
8. If you have any questions or problems regarding the operation of any apparatus or piece of equipment, do not hesitate to ask the instructor.
9. Employ care and caution in using all laboratory equipment or materials. Use but do not abuse.
10. Keep the equipment manuals in same condition as you found them. Do not write on or remove pages of the manuals. You may photocopy pages of the manuals with permission.
11. Keep the lab neat and orderly at all times. Before leaving the laboratory, make sure that all equipment has been turned off and, when appropriate, returned to its designated place unless otherwise directed by the instructor.

Leave the laboratory as you found it, so that your fellow students in the next lab will find it clean, organized, and ready for use.

Other Important Class Information:

Northern Kentucky University has adopted both an Honor Code and a Code of Student Rights and Responsibilities (http://www.nku.edu/~deanstudents/student_rights/honor_code.htm and http://www.nku.edu/~deanstudents/student_rights/index.htm). The work you will do in this course is subject to the Student Honor Code. The Honor Code is a commitment to the highest degree of ethical integrity in academic conduct, a commitment that, individually and collectively, the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements. You are expected to read and familiarize yourself with both of these.

Important Dates:	August 22 (M)	First Day of Class
	August 27 (SAT)	Last Day to Register
	September 5 (M)	Labor Day Holiday
	September 12 (M)	Last Day to Drop without Grade Appearing on Transcript
	October 17 - 18 (M - T)	Fall Break Holidays
	October 22 (SAT)	Mid-term Grades Due
	October 31 (M)	Last Day to Withdraw with a W
	November 24 - 26 (W - F)	Thanksgiving Holidays
	December 9 (F)	Last Day of Classes

The instructor may modify this syllabus at any time during the semester.

Request further explanation if any part of this syllabus or any course procedure or requirement is unclear.