

# Physics 284 Modern Physics Laboratory

Fall 2016

Wednesdays , 3:30pm – 6:10 pm, Faraday 121A, for lectures we will meet in Rm 129 which is down the hall from 121A.

## Instructor:

Professor George Coutrakon,

Office: Faraday Hall 218 (up one flight of stairs from lab room)

Phone: (815) 751-7902

Office hours: Wednesday 1:00 pm - 2:00pm, Friday 1:00pm-2:00pm

email: gcoutrakon@niu.edu

## Web Site

<http://webcourses.niu.edu> (Blackboard course page)

Grades and class materials such as lab instructions will be placed on the Blackboard course page.

## Lab Instructions

Instructions for all the labs are available on the web and should be downloaded and read before starting the lab.

## Grading

The laboratory grade will be based on 6 experiments, one HW given in the first week, and one report ( called the 7<sup>th</sup> lab) that uses the results of 3 previous labs to determine fundamental constants,  $h$ ,  $e$ , and  $m_e$ . Each lab report and the first week's HW will count 12.5% of the final grade. The first week's HW is a dry lab to find the slope of a line and the error in the slope of a line from fictitious data given to you. The reports, excluding the first week's HW, should be approximately 4-6 pages in length (including figures and data tables). Limit the theory discussion to  $\frac{1}{2}$  page in the introduction. In each report ( except Lab report #7) there should be a drawing or photo of your lab equipment that shows how key components and the devices used to take measurements. The critical components in the drawing or photo should be labeled with arrows that can be referred to in the text. General guidelines for how to complete lab reports and a breakdown of how lab reports will be graded are provided on the class web page. Each lab instruction sheet will also have some specific guidelines. **Lab reports are due one week after the completion of the lab.** There will be 2 weeks allotted for each experiment. Reports submitted late without prior permission will be marked down 10% per week and will not be accepted more than 2 weeks after the due date or the Wednesday before the beginning of final exam week, whichever occurs sooner. Pre-lab questions count for 10% of the grade and should be turned in with lab report.

## Lab Notebooks

All students are expected to keep a lab notebook. Since students will work in teams of two, or occasional three, they should either purchase a lab notebook with carbon paper, or make photocopies at the end of class, so that each student retains a copy of the measurement data. It is each student's responsibility to make sure that they obtain a copy of all the notes from each lab.

## Calendar:

Aug. 24	Introduction to 1 <sup>st</sup> two Labs, lab writing, error analysis, and 1 <sup>st</sup> assignment
Aug. 31	Photo-electric effect and spectrometer Labs with Na and H lamps (1 <sup>st</sup> HW due)
Sept. 7	Photo-electric effect and spectrometer Labs
14	Photo-electric effect and spectrometer Labs, 1st lab due
21	Photo-electric effect and spectrometer Labs
28	E/M and Michaelson Morley Labs, lab lecture, 2nd lab due
Oct. 5	E/M and Michaelson Morley Labs
12	E/M and Michaelson Morley Labs, 3rd lab due
19	E/M and Michaelson Morley Labs, Intro. Talk on rad. lab
26	Lab lectures on BB radiation, 4 <sup>th</sup> lab report due , ( start Black Body radiation)
Nov. 2	Black Body Radiation Experiment, Lab #7 (dry lab) report due on e,m and h
9	Black Body Radiation Experiment,
16	Lab lecture on Radioactive Decay and start 6 <sup>th</sup> Lab, Black Body report (#5) due
30	Radioactive Decay Lab (only Radioactive Lab will be accepted after 11-30)
Dec 5	radioactive decay is due

## Optics Labs

Spectrometer with diffraction Grating (1<sup>st</sup> or 2<sup>nd</sup> Lab)

Photoelectric Effect (1<sup>st</sup> or 2<sup>nd</sup> Lab)

Michelson Interferometer (3<sup>rd</sup> or 4<sup>th</sup> Lab)

## Atomic and Nuclear Labs

Electron charge to mass ratio ( 3rd or 4th Lab)

Black Body Radiation, 5<sup>th</sup> Lab

Radioactive Decay, 6<sup>th</sup> Lab

Lab 7 – Calculation of h, m and e from earlier labs where you got h/e , e/m and Rydberg constant. See notes on Error Analysis in General Information.

