

Phys 246: College Physics Lab 2

Fall 2020



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Section ID:	203
Instructor:	Dr. Gabriele Belle
Office:	“My Personal Meeting Room on Zoom”
Email:	gbelle@gmu.edu <i>Please note: All communication via email to your instructor must be through your GMU email account. Your instructor may send information to you via Blackboard email. Make sure you check your email account regularly.</i>
Office Hours:	By appointment
Course Material:	The lab manual is made available on Blackboard as a set of handouts.
Meeting Room:	Virtual classroom – Blackboard Collaborate Ultra
Meeting Time:	Monday 10:30 am to 1:10 pm

Course Description

Physics 246 is a laboratory course intended to provide students with practical experience in physics. It is a core course related to biological systems for life sciences.

Course Goals:

1. To enhance material covered in the main lecture course by exposing students to the actual modeling of the theories and equations discussed in lecture and applying these concepts to biological topics when possible.
2. To teach students the basic techniques of computerized data acquisition and data analysis which includes proper usage of uncertainties, proper graphing and tabular creation techniques, and finally proper analysis of data.

Blackboard Login Instructions

Access to [MyMason](#) and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check [the IT Support Center](#) website. Navigate to [the Student Support page](#) for help and information about Blackboard. In the menu bar to the left you will find all the tools you need to become familiar with for this course. Take time to learn each. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

Required Textbooks

Any College Physics textbook can be used as a reference.

Course Learning Outcomes

1. Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding-
 - a. evolves based on new evidence
 - b. differs from personal and cultural beliefs.
2. Recognize the scope and limits of science.
3. Evaluate scientific information (e.g., assess credibility and validity of information).
4. Participate in scientific inquiry and communicate the elements of the process, including:
 - a. making careful and systematic observations,
 - b. developing and testing a hypothesis,
 - c. analyzing evidence, and
 - d. interpreting results

Nature of Course Delivery

The format of this online course is synchronous. During the synchronous session the pre-lab lecture is recorded and made available in Blackboard Collaborate Ultra. The course is structured around 11 learning units consisting of virtual labs with focus on data analysis. Assignments must be submitted before or on the due date.

Technology Requirements

Hardware: You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and access to a fast and reliable broadband internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. For the amount of Hard Disk Space required taking a distance education course, consider and allow for:

1. the storage amount needed to install any additional software and
2. space to store work that you will do for the course.

If you consider the purchase of a new computer, please go to [Patriot Tech](#) to see recommendations.

Software: This course uses Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the [myMason Portal](#). See [supported browsers and operating systems](#). Log in to [myMason](#) to access your registered courses. Online courses typically use [Acrobat Reader](#), [Flash](#), [Java](#), and [Windows Media Player](#), [QuickTime](#) and/or [Real Media Player](#). Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Anti-Virus software.

Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch [this video](#) about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows.

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Course-specific Hardware/Software

Pasco Capstone: this software is essential for analyzing the given data. Download

link: <https://www.pasco.com/products/software/capstone#downloads-panel>

Installation instructions and license number are in the class resource folder.

Adobe Flash: some simulations require Adobe flash. Please, use google chrome as a browser. Not all browsers support

Adobe flash. Download link: <https://get.adobe.com/flashplayer/>

Java: This software is needed for certain simulations. Download link: <https://www.java.com/ES/download/>

MS Excel or equivalent spreadsheet software: Spreadsheet software is essential for data analysis.

Google Chrome: The only browser in which Blackboard Collaborate Ultra works well.

Course Schedule

Lab	Date	Lab Activity
1	08/24	Introduction & Statistics
2	08/31	Standing Waves
3	09/07	Labor Day (No classes)
4	09/14	Electrostatics
5	09/21	The Capacitor
6	09/28	Building a Circuit
7	10/05	Ohm's Law
8	10/12	RC Decay
9	10/19	Charge-to-Mass Ratio
10	10/26	Geometric Optics 1
11	11/02	Geometric Optics 2
12	11/09	Wave Optics
13	11/16	Atomic Spectra
14	11/23	Make-up lab

Assignments Description

Your lab report consists of three parts, the prelab, the results, and an abstract.

- 1) **Prelab:** You are required to come prepared to the lab session. This preparation includes becoming familiar with the concepts of the lab and the equations used. In your pre-lab document record:
 - a) Title of the experiment, date, and names of all lab partners.
 - b) A brief statement encompassing the purpose of the experiment.
 - c) A table of units of all physical quantities related to the experiment.
 - d) A list of equations.
 - e) An outline of the approach to be performed.
 - f) You are expected to submit your pre-lab prior to the lecture. If this prelab preparation is not submitted, an automatic deduction of 20% will be assessed.

- 2) **Results:** Each group must submit to the instructor a typed lab report consisting of the following material at the end of each lab:
- Sketch(es) of the apparatus with parts labeled if applicable (you can copy the picture from the handout)
 - An Excel spreadsheet with results including graphs, summarized data, including correct units, and tables. Graphs must have a chart title and the axes must be labeled.
 - Analysis and if applicable calculations with clear results; the results must have the appropriate significant figures, and units.
 - A brief statement of the results and a conclusion summarizing what was done in the experiment as well as its outcome. In the conclusion, a comparison of the results to the theory is required.
- 3) **Abstract:** Each student must submit, before the beginning of the next class meeting, an overview of the experiment completed previously. This abstract should be a brief, one – or two –paragraph statement summarizing what was done in the experiment and the principal results. It should be self-explanatory. It must be typed. Hand written and late abstract will not be accepted. You can electronically submit your abstract and upload it to the assignment drop box.

The prelab and the abstract require individual work, while the results require group work.

Table 1: point distribution for each assignment

Prelab	2 points
Results	4 points
Abstract	4 points
Total:	10 points

Course Policies

Late Assignments: All assignments must be turned in on the due date given on the assignment sheet.

Instructor-Student Communication: I will respond to your emails within 24 hours. If I will be away from email for more than one day, I will post an announcement in the Blackboard course folder. Before sending an email, please check the following (available on your Blackboard course menu) unless the email is of a personal nature:

- Syllabus
- Ask the Instructor (on the discussion board)
- On-demand Blackboard videos on how to use Blackboard features, and Technical Requirements.

Feel free to respond to other students in the Ask the Instructor forum on the discussion board if you know the answer.

Lab Manual:

Each assignment is accessible through Blackboard. You are expected to read the handout prior to coming to the virtual class and you must have access to each lab handout during the lab period.

Lab Groups:

Students will usually work in groups consisting of 2-4 students. All members of a group should be involved in conducting each virtual lab experiment. All lab sessions take place in the **VIRTUAL CLASSROOM**. Your instructor will set up a session for each lab. Students will be randomly enrolled in small groups. This means that they will change lab partners each lab session. Each group will have access to its own Blackboard Collaborate Ultra room in which they are presenters. Students should take turns working on the data analysis so that everyone gains the same experience working with Excel and the data acquisition system.

Pre-Lab Lecture:

There will be an introductory lecture at the beginning of each lab but there is not sufficient time to teach the complete basic physical concepts. The instructor will only discuss the application of these basic physical concepts relevant to the experiment. **It is expected that all students arrive on time and not miss any portion of this lecture.** After the lecture, students work in their groups and conduct the virtual experiment scheduled for that day.

Make-Up Laboratory: If a student misses a lab and is excused by the instructor, this student may attend the make-up session.

If a student misses more than three labs he/she cannot pass this course.

Grading Scale

A+	96.7%---100%	A	93.3%---96.7%	A-	90%---93.3%
B+	86.7%---90%	B	83.3%---86.7%	B-	80%---83.3%
C+	76.7%---80%	C	73.3%---76.7%	C-	70%---73.3%
D	60%---70%				
F	Below 60%				

Grade Determination:

Assignment	Points	Total
11 Assignments (10 points each)	110	100%

University Policies and Resources

- Academic Honesty: You are expected to be familiar with and abide by the University's Honor Code. The Code can be found [here](#). It is your responsibility to see me if you have questions about these policies. George Mason University has an honor code that states the following:

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this: Student Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

- Students must follow the university policy for [Responsible Use of Computing](#)
- Student services: The University provides range of services to help you succeed academically and you should make use of these if you think they could benefit you.
- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- [The George Mason University Counseling and Psychological Services \(CAPS\)](#) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance. Counseling Center: Student Union I, Room 3129, 703-993-2380.

- f. Students with disabilities who seek accommodations in a course must be registered with the [George Mason University Office of Disability Services \(ODS\)](#) and inform their instructor, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations **MUST BE MADE BEFORE** assignments or exams are due. I cannot adjust your grade after the fact.
- g. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- h. [The George Mason University Writing Center](#) staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. University Writing Center: Robinson Hall B Room 213, 703-993-1200. The writing center includes assistance for students for whom English is a second language.
- i. [Diversity](#): George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.