George Mason University Physics 244

Syllabus: College Physics I Lab – Spring 2022

Section ID:	**201**
Instructor:	**Dr. Gabriele Belle**
Office:	**Planetary Hall, Room 201B**
Email:	**gbelle@gmu.edu** ***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.*
Office Hours:	**Wednesday from 2:00 -3:00 pm online and by appointment**
Course Material:	The lab manual is made available on Blackboard as a set of handouts. This course section is taught f2f only.
Meeting Room:	Planetary Hall, Room 228A
Meeting Time:	**Monday 10:30 am**

Course Description:

Physics 244 is a laboratory course intended to provide students with practical experience in physics. In this course, students will conduct experiments in Newtonian mechanics, fluid physics, and investigate oscillations. It is a core course related to biological systems for life sciences. The goals and learning outcomes are listed below.

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.

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

Tentative Schedule and Activity Description:

Week	Date	Lab Activity	Description and Purpose of the Assignment
1	01/24	Introduction & Statistics (**Mandatory Attendance)**	Error analysis - students are introduced to the basics of error analysis.
2	01/31	Amoeba Motion	Exploring the motion of an amoeba on a glass slide – understanding scaling and how to use MS Excel to analyze motion parameters.
3	02/07	1-D motion	Determining position, speed, and acceleration of a moving person; Creating and interpreting a motion graph; Getting to know CAPSTONE.
4	02/14	Free Fall	Bouncing a ball – students will explore how to determine the gravitational acceleration from a free-falling ball.
5	02/21	Projectile Motion	Video analysis of a motion in 2 dimensions – students will analyze the horizontal and vertical motion of a tossed ball.
6	02/28	Newton's Laws	Understanding forces, the cause of motion. - students will investigate the motion of a cart on an almost frictionless track.
7	03/07	Conservation of Energy	Launching a cart up an inclined track – is energy conserved? Students will explore the relationship between kinetic and gravitational potential energy.
8	03/14	Spring Break (no classes)	
9	03/21	Conservation of Momentum	Investigating elastic and inelastic collisions. – Students will determine if energy and momentum in collisions are conserved.
10	03/28	Statics & Torque	Exploring torque, the force that sets an object in rotational motion. - Students will explore equilibrium by balancing a meterstick.
11	04/04	Pendulum	Observing harmonic motion. Investigating the motion of a pendulum. Is energy conserved?
12	04/11	Archimedes Principle	Determining the density of a floating object. – Does Archimedes principle allow for an accurate determination of an object's density? Under which conditions?
13	04/18	Venturi	Understanding the relationship between speed and pressure of a liquid in a tube. How does it relate to energy?
14	04/25	Make-up Lab (Students will work on the lab they missed)	
15	05/02	Snow day make-up lab	

Grading:

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
12 Assignments (10 points each)	120	100%

General Information:

Experiments will be performed as shown on the lab syllabus but it may be necessary to modify the schedule. Lab handouts will be made available on a weekly basis. All labs will include an introductory lecture followed by completion of the laboratory assignment.

Assignments: Your assignment consists of three parts, prelab, results, and abstract. The prelab and the abstract require individual work, while the results require group work.

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 you must record:
   a) Title of the experiment, date, and names of all lab partners.
   b) A brief statement encompassing the purpose of the experiment. A table relating all physical quantities of the experiment to its units; a list of all relevant equations. Equations must be typed with an equation editor; a summary of the approach to be performed, and your hypothesis.
   c) You are expected to submit your prelab to your instructor prior to the lecture.

2) ***Results:*** Each group must submit to the instructor a report that includes the following material at the end of each lab:
   a) Sketch(es) of the apparatus or a picture with parts labeled. You may copy the picture from the handout. Make sure you understand what exactly the apparatus is.
   b) All plots produced during the lab should be copied from Excel to the results report.
   c) Summarized data, including correct units, tables.
   d) Calculations with clear results; the results must have the appropriate significant figures, and units.
   e) 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.
   f) At the end of each lab, each student must submit the original copies of the prelab and each group should submit the original copies of the results.

3) ***Abstract:*** Each student must submit, before the beginning of the next class meeting, an overview of the experiment completed the previous week.

This abstract should be a brief, 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. Do not type the text into the submission box on Blackboard. Only MS Word or Pdf files will be accepted. You can electronically submit your abstract and upload it to the assignment drop box.

Table 1: *Point distribution for each assignment*

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

Lab Manual: Each assignment is accessible through Blackboard. The lab handout must be downloaded before each class. **You are expected to read the handout <u>prior</u> to coming to class and you must have access to each lab handout during the lab period**. Students are not permitted to print the lab handouts using the printers in the laboratory.

Lab Groups: Students will usually work in groups consisting of 2-3 students. The maximum number of students allowed in a group is 3. All members of a group should be involved in conducting each lab experiment. Students who engage in activities not related to the course will receive a "grade" of "0" on the results-report. Computers will be used for data acquisition and analysis in most experiments. Students should take turns working on the computer so that everyone gains the same experience working with Excel and the data acquisition system. Students will be randomly seated. This means that they will change lab partners each lab session.

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 experiment scheduled for that day. Since the introductory lecture is a necessary part of the lab session, **students who miss the entire lecture WILL NOT be permitted to do the experiment. If you are late by 10 minutes, the 2 points assigned to the pre-lab will be automatically deducted** (see Table 1 in the assignment section of the syllabus).

Attendance: Lab attendance is mandatory. No laboratory can be turned in for grading if the student did not attend the lab session where the data was collected. Students will not leave the lab room other than to go to the restroom without permission from the instructor. The instructor will provide a sign in sheet. Students need to sign in at the beginning of class.

Make-Up Laboratory: If a student misses a lab and is excused by the instructor, this student may attend the make-up session. You can only miss and make-up one lab. If you miss more than one lab, it will affect your grade. If a student misses more than three labs he/she cannot pass this course.

Technology Requirements: Lab activities in this course will use the Blackboard learning system, available at https://mymason.gmu.edu. You are required to have regular, reliable access to a computer with an updated operating system and a stable broadband Internet connection. For attending online office hours via Blackboard Collaborate or Zoom, students are required to have a device with a functional camera and microphone. In an emergency, students can connect through a telephone call, but video connection is the expected norm.

Other Course Policies:

Academic Integrity: GMU is an Honor Code university; please see the university catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Plagiarism is a violation of the honor code. All work done outside the lab must be completed individually. Students may discuss their work with their lab partners but the work must be done individually and copying is strictly forbidden. Any two abstracts/pre-labs that have identical sentences or have paragraphs with identical structure will be considered plagiarism.

Sharing of instructor created materials, particularly materials relevant to assignments or exams, to public online "study" sites is considered a violation of Mason's honor code. It also violates important ethical standards.

Students are required to comply with all university policies. For more information go to https://universitypolicy.gmu.edu/all-policies/

Lab Safety: Students must comply with lab safety rules. The lab safety handout is posted on blackboard in the "Introduction" content folder. Students are required to print it out, read it carefully, then sign it and bring it to the first day of class.

Cell phones: Cell phones must be turned off and **stowed away from the lab table**. Students who are caught texting, emailing, or checking emails on their cell phone during class time, will be asked to leave the laboratory room and will receive a grade of "zero" for the lab.

Computer use: The computers in the lab room are to be used for class work only . Computers may not be used to work on assignments for other classes. To be able to access all software installed for this course, students must log on with the given username and password. Students should never use their Mason Net ID. You may use your laptop or tablet for note taking **only if the instructor gives permission to do so. Do NOT turn off the computer before you leave.**

Lab-computers may not be used for any purpose until the lecture is over. At no time may they be used for reading e-mail or web surfing. After the lab session, you may email your results to your account or save them on a memory stick.

Classroom courtesy: Use the lab time to work on physics only. Students who disrupt the classroom with loud, inappropriate, or off-topic conversations may be asked to leave the lab after a warning. Show courtesy to your fellow students and to your instructor by giving whole-hearted attention to the topic at hand.

Food and drink: Food and drink are not permitted in the lab room**.**

Visitors: You may **not** bring visitors to the lab with you, even if they are students enrolled in other sections of the course. **Students may not complete their work or make up missed labs in other sections.** You must attend the section in which you are enrolled in order to get credit for the class.

Withdrawal: If you need to withdraw from this course you must do it within the University established time frame. For spring 2022 the last day to withdraw with no tuition penalty is February 7. From then on tuition

penalties apply. See the GMU academic calendar https://registrar.gmu.edu/calendars/spring_2022-1/ for other important dates.

Safe Return to Campus Statement: This is a face-to -face course. All students are required to follow the university's public health and safety precautions and procedures outlines in the university Safe Return to Campus webpage (https//www2.gmu.edu/safe-return-campus). All students must also complete the Mason COVID Health Check. Only students who receive a "green" notification are permitted to attend courses with a face-to-face component. If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Your instructor is allowed to ask you to show you that you have received a "Green" email and are thereby permitted to be in class.
Students are required to follow Mason's current policy about facemask-wearing. Currently all members of the Mason Community are required to wear a facemask in all indoor settings, including classrooms An appropriate facemask " https://www2.gmu.edu/safe-return-campus/personal-and-public-health/face-coverings" must cover your nose and mouth at all times in our classroom. If this policy changes, you will be informed; however, students who prefer to wear masks will always be welcome in the classroom.

Campus Closure or emergency Class Cancelation/Adjustment Policy: If the campus closes, or if a class meeting needs to be canceled or adjusted due to weather or other concern, students should check Blackboard for updates. Your instructor will send out an announcement how to continue learning and for any changes to events or assignments.

Diversity and inclusion: We see to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

Other Important Information

Office of Disability Services:
If you are a student and you need academic accommodations, please see me and contact the Office of disability Services (ODS) at 993-2474. All academic accommodations must be arranged though the ODS.
https://ds.gmu.edu/
COVID -19 Note: Students who have a Covid-related disability should contact the ODS. The instructor is not expected to create accommodations outside of the DS official guidelines.

Other Useful Campus Resources:
Learning services Department helps students with time management and study skills. Use this resource for short classes, videos to watch, or counseling toward becoming a master of your own time.
https://ulife.gmu.edu/

Writing Center:
A114 Robinson Hall; (703)993-1200 https://writingcenter.gmu.edu/

Counseling and Psychological Services (CAPS):
(703)993-2380; https://caps.gmu.edu/